CHANDIGARH- THE CITY BEAUTIFUL- THE PAST AND THE PRESENT
COMPARISON OF CHANDIGARH WITH TRADITIONAL INDIAN CITIES AND ANALYZING THE CHANGES IT HAS UNDERGONE

by

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ABSTRACT

The partition of India in 1947 presented urban planners with the opportunity to design a new city. The designers and patrons of Chandigarh hoped that new ideas of urban planning could be applied to generate a design that would be free from the problems that were evident in existing Indian cities and be a model for future projects.

Chandigarh was built at a time when there was debate in architectural circles about the architectural and urban strategies the new nation should follow. The debate was polarized between emulating traditional cities or following a modernist approach, which was synonymous with Westernization. The path that Chandigarh was to follow was made by the decision to employ the services of Western architects. Nevertheless the leaders of the design team, Le Corbusier, Pierre Jeanneret, Jane Drew and Maxwell Fry did attempt to modify modernist and Western planning and design principles to the Indian social, cultural, technological and economic context.

The research involves a study of the normative fabric and urban structure of Chandigarh and its comparison with that of traditional North Indian cities to establish the relationship between the design strategies of Chandigarh and Indian architectural and urban traditions. A study of the traditional helps to clarify the changes the urban and living patterns have undergone and the nature of the complexities inherent in cities.

Housing, which forms an integral and major part of the urban fabric, is emphasized because of the role of that it plays in the life of the inhabitants. Housing is not simply a utilitarian shelter, but is also a cultural phenomenon, representing the changing values, perceptions and lifestyle of the inhabitants. Thus, emphasis is also placed on the changes the fabric of the sector has undergone over time in order to evaluate the effectiveness of the original design strategy.

The housing in the city cannot be seen in isolation from its immediate environment. Of equal importance is the larger housing fabric, the open spaces and the related functions. The house, forming the private living space is one part of the larger arena for daily activities as is seen in a *mohalla* in the traditional Indian city. The normative fabric and the urban structure of Chandigarh is thus analyzed in relationship to its social, cultural, technological and economic context and compared to the traditional Indian city with a view to guiding future development in Chandigarh.

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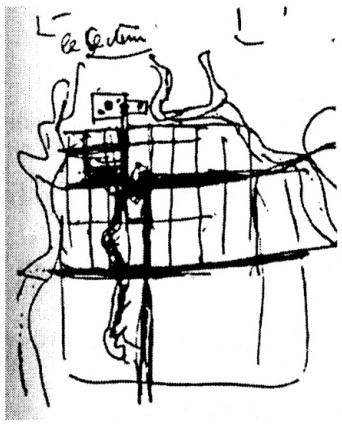
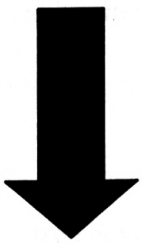
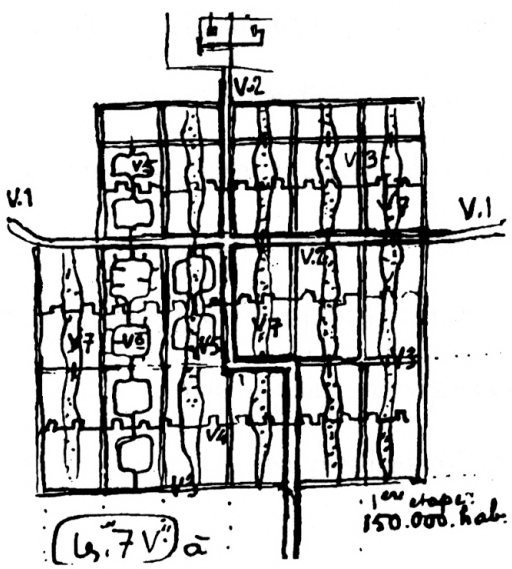
SECTION 1

METHODOLOGY







CHAPTER 1.1
INTRODUCTION

Of importance in determining the nature and quality of life in the city are two aspects: the monuments, that serve as representational symbols for the city, and the normative fabric that caters to the other four broad functions of daily life: housing, work, recreation and traffic.

In medieval and Renaissance cities the monuments, according to Alan Colquhoun, became a "synadoche for the whole city"[1]. In these cities the monuments were the church, the palace and the city hall. The monuments in the present-day city constitute a multitude of several other types of public buildings such as hotels, schools, airports or railway stations, and shopping galleries. Though their significance in the city has remained intact, it has been accompanied by increased public attention to the normative fabric of the city, especially in view of the degeneration of city life at the time of the industrial revolution.

The industrial revolution had caused several political, economic and technological changes in the cities. It had resulted in an increase in population of the major urban town centers, most of which were ill equipped to handle such an unprecedented growth. It led to urban congestion, sanitary problems, insalubrious living conditions and lack of urban aesthetic quality. The squalor of the industrial city raised concerns about living conditions and a lack of harmony and order in the city. This prompted sociologists and planners to focus on the need for improved housing, provision of adequate sewerage facilities and water supply, attention to hygiene, provision of adequate light, greenery and

[1] Colquhoun, Alan. (1981). *The Superblock.* In *Essays in Architectural Criticism.* Cambridge: The MIT Press. P.87.

ventilation and improvement of the urban aesthetic. Such views were presented in manifestoes by sociologists such as Marx and Engels and in the Utopian socialist views of reformers such as Robert Owen, Charles Fourier, John Ruskin and William Morris. There was an increased emphasis on the relationship between spatial and social order within the city. It was believed that cities could be designed to improve the existing social conditions. Most of Le Corbusier's urban design solutions were based on such a view.

In the late 19th and early part of this century, attention shifted to the design of individual housing units. With the urgent need to reconstruct cities after World War I and to provide mass housing, the focus shifted to standardization, affordability and optimization of resources and land. The individual cell and the building block gained importance with a concern for productivity and a search for building types that could be applied universally. There followed an era of modern architecture that redefined the problems of modern cities.

As a result of industrial pollution, another important element of the modern city was an increased tendency to isolate its constituent elements on the basis of function. One such division was proposed by CIAM under the Athens Charter, which divided the city into four functional zones. The basic aim of CIAM was to integrate the idea of contemporary architecture with technical, social and economic thought with a view towards satisfying human needs. CIAM advocated rigid functional zoning, limited types of urban housing (high, widely spaced apartment blocks and row houses), economic efficiency, rationalization and standardization.[2] The modern movement was accompanied by the emergence of new spatial patterns that were no longer based on the "continuity of

[2] For a detailed analysis refer to: Frampton, Kenneth. (1996). *Modern Architecture: A Critical History.* New York: Thames and Hudson, Inc. pp. 269-279.

solids but on a continuity of voids in which constructed elements have burst apart."[3] There was an increased inclination towards stricter zoning and codification to regulate growth and preserve the physical character of the city, which were also means to simplify the urban design problem.[4] The strict land-use stratification and coded visual development of the city was in contrast to the multi-functional land use, defined open spaces and visual variety of traditional pre-industrial cities. These features were instrumental in the particularly vibrant character of the traditional environment. In modern cities, functional zoning, single land-use, proliferation of loosely structured urban spaces, and standardization inverted the spatial character of cities. According to Paul Heyer, "Today we must guard against at least two major pitfalls. Firstly, codification within a time-warp not only negates our natural sense of inventiveness, it means antiquated attitudes and methods to confront changing and emerging problems. Secondly, space empirically necessitates definition, physical and philosophical. The cohesiveness of older cities has too often been replaced by too much space today and a lack of idea about how to use that space. The never-never-land of in-between becoming itself the urban (lack of) experience."[5]

Chandigarh, the new capital city for Punjab, was conceived in the context of such modern, machine-age urban ideas. It is also important to consider that at the time of Independence in India, the effects of both the industrial revolution and the post-war modern movement had not substantially altered the urban structure or living conditions of most cities. The most important factor affecting change in Indian cities before

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[3] Choay, Francoise. (1969). *The Modern City: Planning in the 19th Century.* New York: George Braziller. P.32.
[4] Gosling, David & Barry Maitland. (1984). *Concepts of Urban Design.* New York: St.Martin's Press.
[5] Heyer, Paul. (1995). *Urban Essays.* New York: Civilities International. P.27.

Independence had been Colonial rule. Pre-Independence India was far removed from the strategies and concepts of western urban planning and still followed the traditional model, interspersed with Colonial town planning principles imposed by the British. It was Chandigarh that introduced modern town planning ideas to India. Thus, to study the planning and normative fabric of Chandigarh, it is important to first study the conditions existing in India at the time of Independence and also to study the traditional North Indian city.

The research focuses on the normative fabric of the city within the broader context of the urban structure, while also focusing on the urban open spaces (the streets and squares) and other related functions. The normative fabric of a city is crucial in that it has the potential to alter the living pattern of the inhabitants. According to Karl Marx, "by acting on the external world and changing it, [man] at the same time changes his own nature".[6] Within the normative fabric of the city, the individual living unit, the dwelling and related open spaces are of prime importance. It is here that the inhabitants of the city spend a great part of their time. It is in the dwelling and the immediately related open spaces that most family activities are carried out. This study, thus, focuses on these two aspects of the city.

[6] Quoted from: *Gosling & Maitland*, p.10.

CHAPTER 1.2

BACKGROUND

Pandit Jawaharlal Nehru, on 14 August 1947, at the eve of the Independence of India, made a profound statement in a speech to the national assembly.

> *Long years ago we made a tryst with destiny, and now the time has come when we shall redeem our pledge, not wholly but in full measure. At the stroke of midnight while the world sleeps, India will awake to life and freedom. A moment comes, which comes rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a nation long suppressed finds utterance.*[7]

This statement reflects the mood of the country at the time Chandigarh was conceived. It was a time of great change. The country had just been liberated from almost two hundred years of British dominance. The exuberance of Independence was accompanied by general confusion as to the appropriate strategies for the future. There were several factors that were of primary concern for the leaders of the new nation. There was the new constitution to be chartered, laws to be made and the country to be united as a single entity from an agglomeration of independently governed princely states. But the most severe crisis, needing immediate solution, was necessitated by the partition of the country that had led to the problem of accommodating the massive influx of refugees from across the border.

The other pressing problem was to provide a new capital city for Punjab, the state that was most affected by the partition. The state of Punjab was literally torn into two and the part that was conceded to Pakistan consisted of Lahore, the capital of the undivided Punjab. Lahore had long been the social and cultural center of the state and the region. Its

loss was a great psychological setback for the already disenchanted people of Punjab. Not only had they lost their land, their fortunes, their friends and relatives but also the city they were so proud of. It was thus politically important to provide a vision of a new city that would raise their fallen spirits and restore some lost glory to the state. Thus, it was decided to build a new capital city that was subsequently named Chandigarh.

The next dilemma that faced the leaders of the nation was whether the new city should be designed along the lines of existing cities or should it be a new model for the future. This uncertainty was symptomatic of a transition phase between the traditional and the modern, had been a part of Indian architectural culture since some time before Independence. Indian architects were faced with complex questions about symbolism, cultural and regional identity, aesthetics, modernization and industrialization. On the one hand there was the inclination to follow the 'International style' as a representation of India's desire to be a part of the modern world. The design of Chandigarh by Le Corbusier formed an important starting point for this position. On the other hand, there was an inclination to shrug off the Colonial past and reject Western modernity. This position associated 'Westernization' with being 'anti-Indian'. The proponents of this movement looked to the traditional past for inspiration and sought 'De-Europeanization or Indianization'[8] of the country. These two movements have run parallel ever since and the tension between them can be felt in architectural circle in India to this day.

India has always been a "melting pot" where influences from diverse cultures that have been incorporated into the Indian context. Today it is often difficult to classify what

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[7] Lang, John, Madhavi Desai & Miki Desai. (1997). *Architecture and Independence. The Search for Identity—India 1880 to 1980.* Delhi, India: Oxford University Press. p. 178

is indigenously Indian. The most profound of these influences has been that of the Mughals on the art and architecture of the region. It can however be said that in spite of this juxtaposition of many cultural influences a basic 'Indianess' has always been preserved.

Thus, to understand the forces that led to the design of Chandigarh, it is important to understand the social, political and architectural conditions that existed at that time. The evaluation or criticism of Chandigarh must therefore be carried out in light of the complex circumstances of that time. It was a product of the precise moment of its conception and it is very difficult to say what it would have been like if conceived at any other moment.

The moment it was decided to employ the services of Western planners to design Chandigarh, it became clear that the new city was meant to be different from traditional Indian cities. It is evident in Prime Minister Jawharlal Nehru's speech on the occasion of the inauguration of Chandigarh in which he says, "Let this be a new town symbolic of the freedom of India, unfettered by the traditions of the past...an expression of the nation's faith in the future."

In 1949 the first master plan of Chandigarh (Fig.1.1) was prepared by Albert Mayer. The neighborhood super-block (Fig.1.2) was based primarily on western concepts that he modified to suit the Indian context. Later in 1950 came Matthew Nowicki's

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[8] *Ibid.*, p.12. This term is used by Lang and Desai's to describe the movement to get rid of the European Colonial presence. The advocates of this movement advocated the use of traditional Indian methods to run the country.

alternative "leaf plan" (Fig.1.3) and proposals for housing, which made a stronger effort to blend modern western ideas with Indian traditions and the indigenous way of life.

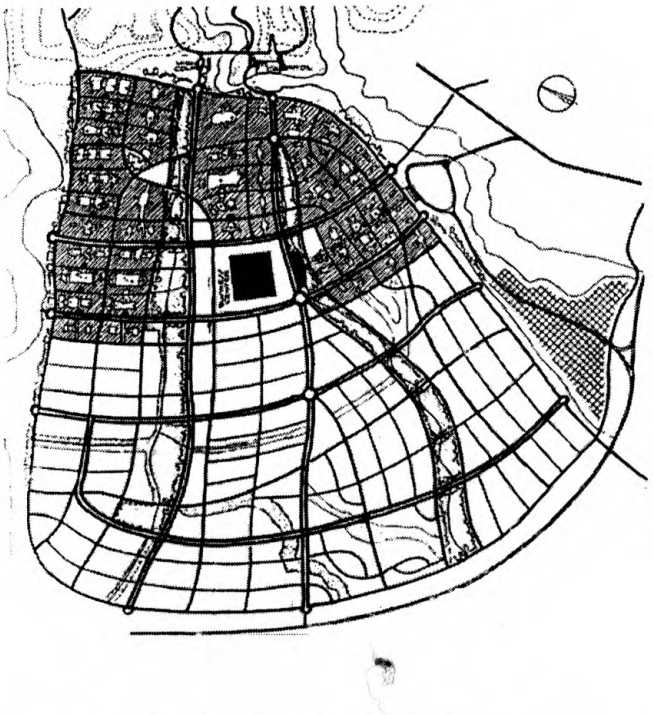

Fig. 1.1 Albert Mayer's Master Plan of Chandigarh

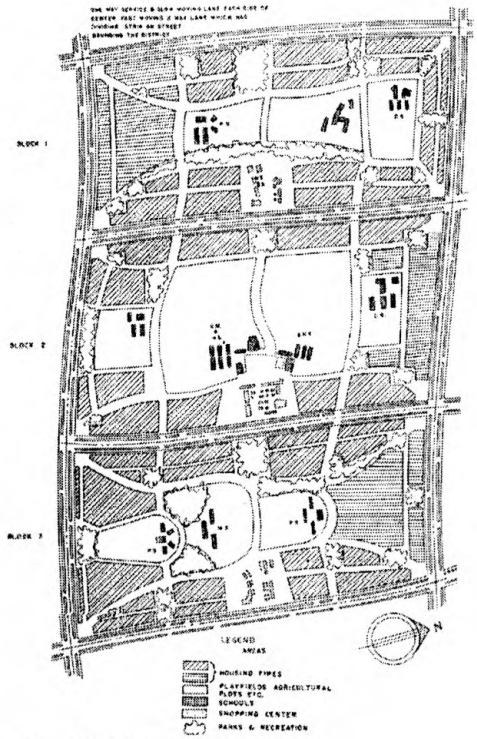

Fig. 1.2 Mayer's Superblock

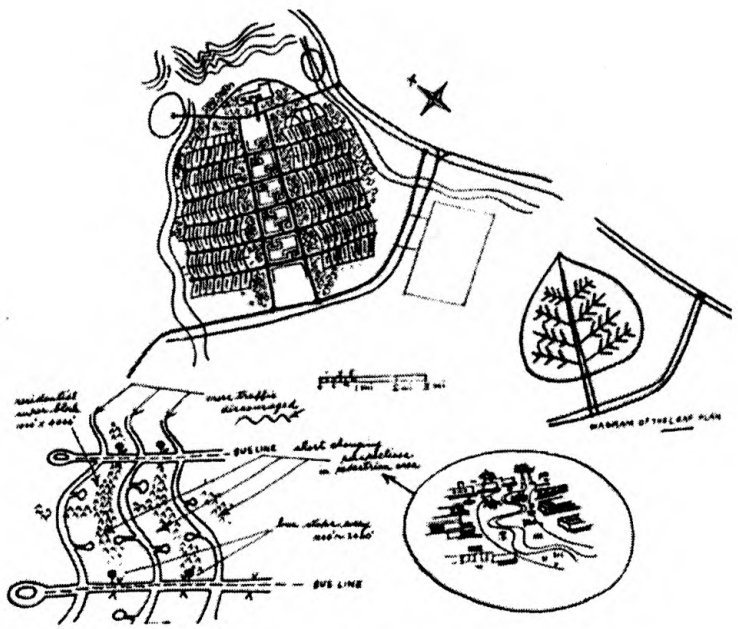

Fig. 1.3 Matthew Nowicki's Leaf Plan.

This intention is particularly reflected in his design for houses, which were generally organized around a courtyard (Fig. 1.4).

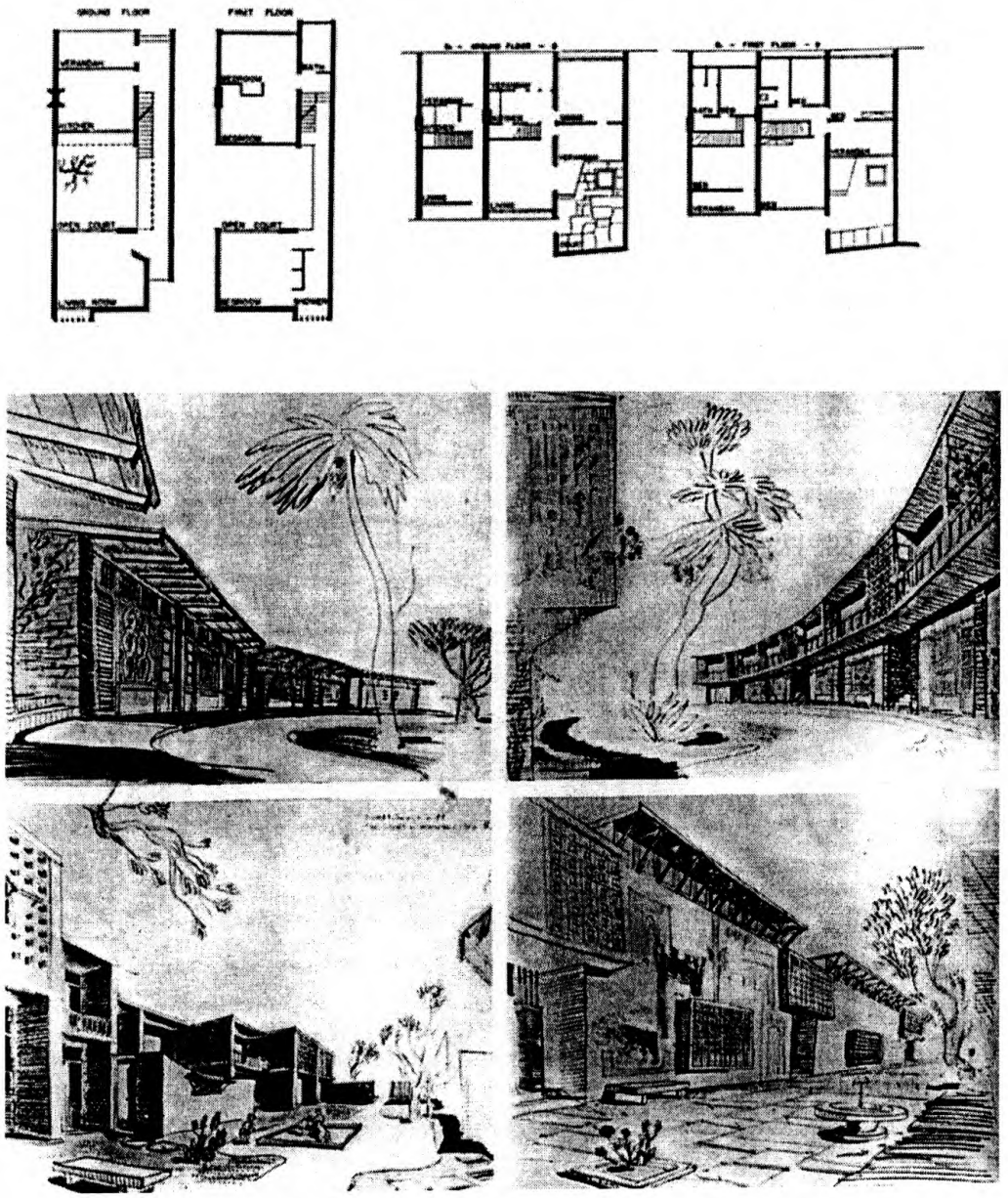

Fig. 1.4 Proposed housing by Matthew Nowicki.

It was however, Le Corbusier and his team that prepared the eventual master plan (Fig.1.5). With precedence in Le Corbusier earlier city designs such as the Contemporary City and the Radiant City, the plan for Chandigarh has several similarities and differences with traditional North Indian cities in the overall structure of the city, layout of the individual sectors or blocks and even in the layout of the individual houses within the sector.

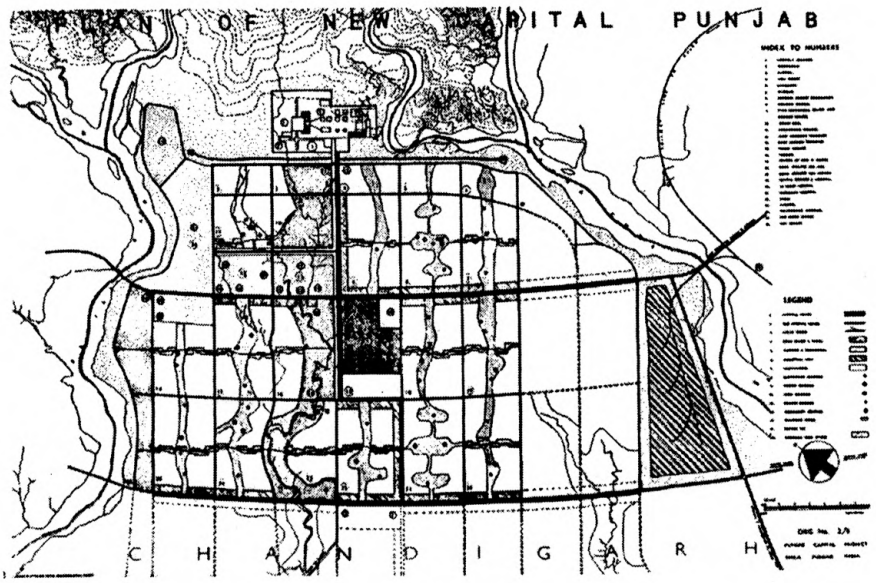

Fig. 1.5 Master Plan of Chandigarh by Le Corbusier.

The city of Chandigarh has undergone several changes since its inception to meet the requirements of the population and the growing demands of urban life. As the city has changed this has been accompanied by a change in the habits and attitude of the inhabitants. Chandigarh, at that time offered an urban structure, new and unique in the

Indian context, for the refugee population. They embraced it but with doubt and skepticism.[9]

Today the city is witnessing unprecedented growth that has put pressure on its infrastructure and boundaries[10]. Growth coupled with changes in the cultural, political, socio-economic conditions and lifestyles of the people has altered the course of the city and has led to changes in the housing pattern.

The most pressing challenge for the city is to provide satisfactory housing to the population. The 'minimum dwelling' proposed by the original team is today too expensive and individual houses are being replaced by multi-storied housing blocks and single-family units today often house even more than two families.

One of the aims of this study is to understand these changes by examining three sectors in Chandigarh, one in each phase of the city's development[11]. This provides a time-line for studying the changes in housing, layout and use of the sector. The overall objective is to describe differences between typical housing blocks in Chandigarh and traditional north Indian housing block and to describe how the housing design in Chandigarh has changed in the second and third phase of sector development. This is

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[9] Initially people were hesitant to move to the new city as was reflected by the low number of plots sold in the first stage of Chandigarh. The reason may be several. Some of them may probably be that the entirely new setup projected an uncertain fate for the city which was far away from the original hometowns (east and west Punjab) of the refugee population that the city was to primarily house and the development of the city was being impeded by administrative and economic problems.

[10] The city is today facing a problem in housing the increasing population that was already 642,015 inhabitants according to the 1991 census, with the density of population being 5631 per sq. kms. One way to counteract the growth of a city is to expand its boundaries, but in the case of Chandigarh there are strict guidelines about the extent of the boundaries and according to The Periphery Control Act of 1952. The Act created a wide green-belt around the entire union territory. It regulated all development within 16 kilometers of the city limit. To preserve the verdant surroundings, the establishment of any other town or industrial development is forbidden. Thus expanding the city is not a possibility.

[11] The First Phase of Chandigarh was built by Le Corbusier and his team and constituted Sectors 1-30. The Second Phase constituted of sectors 31-47 and the Third Phase, for which the Administration has started acquiring land, constitutes of Sectors 48-61. The Third Phase consists entirely of apartments and has no individual houses in the scheme.

studied as a factor of the incremental growth of the city, which is a direct result of the changing social, political and cultural conditions. The changes in the city will also be studied in relationship to the design intentions of the original design team. Overall, the study is carried out with a view towards future development in both Chandigarh and the surrounding region.

CHAPTER 1.3

OBJECTIVES AND PROCEDURES

The main objective of the study is to compare and contrast typical housing blocks in Chandigarh and traditional North Indian cities and to analyze the changes Chandigarh has undergone since its creation. The first step of the research is to develop a background description of both Chandigarh and the traditional city. This involves first outlining the conditions under which Chandigarh was conceived and the architectural conditions in India at that time. Next an analysis of the master plan by Le Corbusier is carried out through a study of his earlier urban ideas, which were fundamental in the design of Chandigarh. A study of traditional North Indian cities is carried out by outlining the factors involved in their design and describing the elements that form the architecture of the city. From these descriptions, the normative fabric and related elements are described and compared. The resources used for forming these descriptions are:

- Archival research to assist in forming a typology for housing blocks in both Chandigarh and traditional North Indian city.
- An archival study of the Census Series[12] of the North Indian States. The Census series was used to get statistical data on Chandigarh and other North Indian states. Some of this data concerns the growth of urban population in the city, the density of population and housing statistics.
- A study of the social and cultural aspects of the design of North Indian cities was undertaken. This is used to identify the social and cultural implications of space and its use both in traditional cities and in Chandigarh. The study of traditional cities

identified spaces and elements generated as a result of the climatic conditions of the region[13]. Some of these elements are identified as *Chatta* (terrace), *chajja* (roof projection/ overhang), *Jharokha* (shaded window), *jaali* (perforated screen). The climatic control elements used in Chandigarh are also studied. Some of these elements are- brise soleil, brick *jaalis*, landscaping of roads and the provision of a green belt (the 'lungs' of the city according to Le Corbusier). This is mainly an archival study.

- A study of the plans/drawings of sectors in Chandigarh and North Indian cities was undertaken to document figure/ground properties of typical blocks in these cities. The block plans, thus generated, are compared in terms of the layout of housing, the density of built-up areas, the internal organization of spaces and the relationship between open and covered areas.
- Case Study Method: A Case Study of three sectors in Chandigarh is undertaken by means of information collected during the site visit. The sectors studied are Sector 22, Sector 44 and Sector 61. Each of these was selected as prototypical for each phase of construction of the city, thus providing a time-line for any changes in the block characteristics. The information gathered over the site visit includes:
    - Drawings collected from the Chandigarh Administration architecture department. These include the most recent master plan of Chandigarh, layouts of the three

[12] The Census is carried out once every ten years and provides information on the population of most major cities of the state. It also has a section that gives a detailed housing report. Apart from that there is information on urban growth and development in the state over the last ten years.

[13] A valuable resource for climate study is the book on Tropical Architecture by Maxwell Fry and Jane Drew.

Fry, Maxwell & Drew, Jane. (1964). *Tropical architecture in the dry and humid zones*. New York: Reinhold Publishing Corporation.

sectors, the housing types provided, some house plans and the frame control drawings.

- Existing literature on Chandigarh, the various reports from the Census of Chandigarh, and descriptions of the building bye-laws and zoning regulations in the city.
- Pictorial data of the three sectors in the form of photographs and slides.
- The study is supplemented by interviews conducted with a number of architects and planners in the city. This includes several senior architects and planners in the Chandigarh Administration and the Chief Architect of Chandigarh, S.K. Midha. Interviews were also conducted with architects M.N. Sharma and Aditya Prakash, both of who worked with Le Corbusier and his team on the master plan of Chandigarh and have also served as Chief Architects of the city. Discussions were held with several architects practicing in Chandigarh, prominent amongst them being S.D. Sharma who has also served as the Chief Architect of Chandigarh. Apart from this several residents of the city were asked their views about living in the city and how they compared it to other cities in the region.
- Observations made during the site visit to Chandigarh and Delhi are used to determine the use patterns of housing blocks in these cities. An effort is made to relate and compare these observations with the living experience the author has had in a traditional city as well as in Chandigarh.

The research can thus be said to have three objectives listed below.

OBJECTIVE I

To understand the morphostructure of a traditional North India city.

Procedure for Objective I

A case study of two cities in North India is undertaken. The cities selected are, Old Delhi and Jaipur. Jaipur is selected as an example of a geometrically designed Indian city, based on ancient Hindu canons on architecture and town planning. Old Delhi, though designed on a definite geometry, is selected because of the pattern of its organic growth. The description of these cities is formed using the following procedures.

1. Defining and describing the elements that form the physical fabric of a traditional North Indian city and understand its morphology and structure.
2. To acquire an understanding of the climatic, social, cultural and economic factors that determined their design.
3. Figure/ground plan of blocks showing the extent of open and built-up areas in the block and the relationship between them.
4. Schematic plan of a traditional Indian house showing the internal organization of spaces.
5. Section showing relationship between the house and the street and the hierarchy of spaces from public to private space.
6. Pictorial data showing the variety in street façade.

OBJECTIVE II

To define a typical housing block in all three phases of Chandigarh (the master plan by Le Corbusier, Pierre Jeanneret, Maxwell Fry and Jane Drew), trace their evolution and compare them to changes that have taken place in Chandigarh.

Procedure for Objective II

Form a description of the blocks by means of—

1. A study of three sectors, one in each phase of Chandigarh. The sectors selected are:
    - Phase I: Sector 22, which was the first sector to be built in Chandigarh and has most of the housing designed by the architectural team of Jeanneret, Fry and Drew.
    - Phase II: Sector 44, which is closest to a prototypical sector in this phase.
    - Phase III: Sector 61, only a small part of which is in Chandigarh, the rest being in SAS Nagar, a satellite township of Chandigarh.
2. An understanding of the climatic, social, cultural and economic factors that determined the sector designs.
3. Figure-ground plans of each sector showing the extent of open and built-up areas in the block and the relationship between them.
4. Schematic plan of typical houses showing the internal organization of spaces. Houses are selected to represent the variety of house types.
5. A section showing the relationship between the house and the street and the hierarchy of spaces from public to private.
6. Pictorial data showing the street façade.

OBJECTIVE III

Compare the sectors in Chandigarh with the traditional Indian housing block and trace the differences between the two using the descriptions from Objective I and II.

OVERALL OBJECTIVE

The overall objective is to describe differences between typical city block (sector) in Chandigarh and traditional North Indian housing block and to describe how the sector design in Chandigarh has changed in the second and third phases of sector development. An effort is made to see how the residents have tried to change the city according to their needs and the changing social, political and cultural conditions. The difference between the original design intentions and the existing conditions is highlighted. From a comparison of a traditional block and a sector, factors that could have improved the design of Chandigarh will be identified. The overall aim is to study both the positive and negative aspects of the design of Chandigarh, with a view towards future development.

SECTION 2

CONCEPTION OF CHANDIGARH

Chandigarh like new India was born in the exhilaration of freedom and the tragedy and trauma of partition which was felt more intensely and intimately by Punjab than any other part of India. It has grown as a challenge to adversity and a promise for the future. It is symbolic of the indomitable spirit of the enterprise of the people of Punjab.

-- R.K. Narayan, President of India, January 9, 1999[14]

[14] Excerpt from the speech by the President of India, K.R. Narayan at the inaugural session of the conference "Celebrating Chandigarh: 50 years of the idea", on January 9, 1999.
Chandigarh Perspectives & Konstruct Systems. (1999). *Speech by President of India.* [World Wide Web page]. Available: http://www.cperspectives.org/events/others/pres_speech.htm. 20 April, 1999

CHAPTER 2.1

THE NEED FOR A NEW CAPITAL CITY

To understand the conception and development of Chandigarh, it is important to go back to the context of Independence and review the political, social, cultural and economic conditions at that time. Any city is a product of a particular time and place, forming its 'context'. For Chandigarh, the context was defined by the partition of India at the time of Independence, necessitating the construction of a new capital city that would reflect the 'spirit' of the country. The agenda defined by the particular circumstances emphasized progress (for some adopting modernism was synonymous with progress) and self-sufficiency. This led to the complex question of an appropriate symbol for a new identity for the country, which became a pressing concern of both the leaders of the new nation and its people. A short description of the 'context' will thus help form a description of the city.

THE CONTEXT

On midnight of August 15, 1947 India gained freedom. With the unification of British India and the numerous princely states of the region it became an independent nation which stands today as the world's largest democracy. But this enthusiasm and joy was accompanied by religious fervor and strife. The British complied with the demands of the Muslim League and the nation was split to form the independent state of Pakistan. This division cut across not only the land but also the hearts of people, killing thousands and rendering a lot more homeless.

As a result of the partition, the original province of Punjab was divided between India and Pakistan. Lahore, the original capital of Punjab fell within the boundaries of the newly created Pakistan (Figs. 2.1 & 2.2). The Northwest, consisting of divided Punjab, Sind, Baluchistan and the northwestern provinces became West Pakistan. The Northeast with the Eastern half of Bengal became East Pakistan, which is now Bangladesh. The rest of the sub-continent was the Independent India.[15]

Fig. 2.1 Map of British India

Fig. 2.2 Map of Independent India.

The division of the sub-continent was particularly important for the province of Punjab that fell on either side of the line dividing India and West Pakistan. The part of Punjab in India was left without a capital. This created the need for a new capital city for Eastern Punjab. At the same time the nation was besieged by a tumult of religious warfare and mindless slaughter. It was amidst such a backdrop that the conception of Chandigarh, the capital for the Indian province of Punjab, came about.

[15] Wolpert, Stanley. (1965). *India.* Englewood Cliff, New Jersey: Prentice-Hall, Inc. P.147.

Punjab had always been a culturally active and prosperous state. As a cultural entity Punjab's roots can be traced back by at least a thousand years. Even during the Mughal reign of India, Punjab had maintained its separate identity and was one of the most prosperous states of the region. But on the recommendations of a British lawyer, Radcliffe and the insistence of the Muslim League, the province was for the first time divided by political boundaries.[16]

There was a massive influx of refugees from both East and West Pakistan into India. An estimated ten million people crossed the border from both the frontiers (Punjab and Bengal) and an estimated one to one half million people lost their lives in the mayhem of partition.[17] The existing towns were unprepared and ill equipped for such a massive migration of people. The infrastructure was too weak to provide even basic services such as adequate water supply, drainage, sanitation and transportation. Moreover these cities did not offer much scope for housing the administrative services required of a capital city. Moreover, no existing city could match the glory, splendor and cultural vitality of the old capital, Lahore. According to former Chief Architect of Chandigarh, Aditya Prakash, "The problem was not just one of resettling people but of providing a symbol of hope for the people who were nostalgic about Lahore. They needed a symbol,

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[16] Sharma, Kavita, Chitleen K. Sethi, Meeta & Rajivlochan. (1999). *Chandigarh Lifescape: Brief Social History of a Planned City.* Chandigarh: The Chandigarh Administration. P.19.
[17] *Wolpert*, p.149.

A detailed account of the refugee influx can be found in the book:
R.N. Saxena. (1961). *Refugees. A study in changing attitudes.* Bombay: Asia Publishing House.
According to the author, a refugee may be defined "as a person who would not like to migrate from his homeland but for reasons beyond his control, political, religious or economic, that may have been rendered his life unbearable and unlivable. Thus, for all intents and purposes, the migrants from the Western Punjab (now known as Western Pakistan) are refugees."

A more poignant account of the refugee movement can be found in the book:
Singh, Khushwant. (1961). *Train to Pakistan.* New York: Grove Press.

a city they could be proud of. There was practically no money for that but there was the immense will to do that."[18]

Thus, the question of providing a new capital city became more logical than that of transforming an existing one to fit the needs of a capital city. Though the capital was temporarily moved to Shimla, the summer capital of the British India, it was not possible to house it there permanently.

At this point, the state administration was confused and hesitant to take a decision on this complicated issue. Finally, Pandit Jawaharlal Nehru, the first Prime Minister of independent India, intervened. He consulted a group of urban planners to solve the problem of housing the displaced population and providing a capital city to Punjab. The conclusion to build a new capital city was reached after much deliberation. Several alternatives were weighed including that of making an existing city the capital. The cities under question included Amritsar, Ludhiana, Ambala and Shimla. Most of them were dismissed due to lack of infrastructure and limited scope for expansion. Thus, Chandigarh was born when decision was taken to commission a new capital city.

THE SITE

The first step in the creation of Chandigarh was to select a site suitable for the endeavor. The task of administering the project was handed over to two government officials, P.L. Verma, the Chief Engineer of Punjab and P.N. Thapar, a former British India Civil Service member and subsequent administrative head of the project.

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[18] Quoted from a discussion with the author at City Museum, Chandigarh on 2nd August 1998. Ar. Aditya Prakash is a former Chief Architect of Chandigarh who has also worked with Le Corbusier and his design team on the Capital project.

An extensive survey was conducted and finally the present site in the foothills of the picturesque Shivalik Hills was selected from amongst eight alternative sites. The criteria of selection were economics, ease of acquisition, favorable water supply conditions, favorable ground slope for drainage, adequate supply of building materials, distance from the India-Pakistan frontier, and proximity to the national capital. Pandit Nehru reflected the excitement about the new site in the statement:

> *The site chosen is free from the existing encumbrances of old towns and old traditions. Let it be the first large expression of our creative genius flowering in our newly earned freedom.*[19]

The site of Chandigarh lies on a longitude of 76 degrees 48 minutes and latitude 30 degrees 50 minutes and the altitude lies between 304.8 to 365.76 meters above sea level[20]. The site was strategically placed with respect to the national capital. It is only 150 miles north of New Delhi and is today easily accessible by road, air and rail. It is also at an adequate distance from the India-Pakistan frontier. The frontier has always been a disturbed sector and was especially so at the time of Independence. The selected site was thus relatively well-placed on the map of India. The 8,500acre site gently sloped towards the south-west with a gradient of 1:00 which was good for natural drainage. The land was fertile and abundantly forested with groves of mango trees. Two seasonal rivers bound the site, Sukhna Choe on the south-east and Patiali Rao on the north-west periphery.[21] The site chosen constituted twenty-four villages and involved the dislocation of about 9,000 people. Even though the villagers were being compensated and relocated, they

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[19] *Sharma, Sethi, et al.*, p. 22.
[20] Kalia, Ravi. (1987). *Chandigarh. In Search of an Identity.* Carbondale, IL: Southern Illinois University Press. p. 13.
[21] Prakash, Aditya. (1983). *Reflections on Chandigarh.* New Delhi, India: Navayug Traders. p.2

were reluctant to give up the fertile farmland and move from their abodes. There was protest from several quarters including several political groups. Even an anti-*rajdhani* committee was formed which threatened to launch a massive *satyagraha* involving around 30,000 people.[22] In general there was a politically motivated uproar about the very idea of a new capital city.[23]

In spite of all the negative reaction to the site and several group demonstrations, work progressed. A detailed survey of the site was conducted and land acquired for construction. The city was named Chandigarh after the goddess Chandi Devi whose temple is situated on a hill on the north border of the site.

Once the site was acquired, the next step was to find a team of planners that could give shape to the lofty visions for the new city. The selection of such a team was not an easy task and caused controversy until the final master plan was formulated by Le Corbusier, assisted by Jane Drew, Maxwell Fry and Pierre Jeanneret.

[22] *Sharma, Sethi, et al.*, p. 26. The term *rajdhani* means capital city and *satyagraha* means fasting as sign of protest.

[23] For detailed information of the problems faced in acquiring the site refer to the books on Chandigarh by Ravi Kalia and Norma Evenson

CHAPTER 2.2

SELECTION OF THE ARCHITECTURAL TEAM

Chandigarh, the new capital city for Punjab, was conceived by the patrons to be a symbol of the hopes and aspirations of a new nation, a city nestled in the arms of the beautiful hills. A worthy architectural team was required for such a noble venture.

This stage of decision making put the leaders of the nation at a crossroads. On the one hand was the desire to venture into the new, to join the mainstream of modernization and on the other was the desire to seek safety and refuge in the familiarity of the old. According to Ravi Kalia:

> *To Indian leaders who had themselves witnessed the character of their cities modified under colonial rule to conform to the needs of an alien government, new towns provided a way of starting afresh, so as to overcome the hatreds, tensions or gross inequities of existing cities.*[24]

Pandit Nehru along with Mahatma Gandhi, were the architects of the new nation and were the leaders the general masses looked up to for inspiration. They had different visions for the new India. Whereas Gandhi professed the need for a rural based society, Nehru sought to develop India into a modern industrial nation. Though one cannot underestimate the influence of Gandhi in shaping India's destiny, it was Nehru's thrust towards the use of science and technology that was instrumental in shaping the future of the country. At that time, architectural circles faced the same dilemmas as the nation in general. Though eager to shake off the Colonial past, there was, on the other hand, some amount of hesitation in deciding the course that architecture should follow. Architects were faced with complex questions of symbolism, cultural and regional identity,

[24] *Kalia,* p.22.

aesthetics, modernization and industrialization. While there was a group of architects looking for inspiration in the traditional past, there was a radically opposite movement which followed the ideas of Nehru and sought a new and modern identity for Indian architecture.

The decision to seek a design team outside India was fundamental in giving shape to the city of Chandigarh. This decision was affected by the lack of experienced architects, urban designers and planners in the country. Most of them had been trained as architects and were not actually planners.[25] Thus, there was an urgent need to look for an experienced design team that could resolve the complexities of the design of a new city. Most of the important planning projects in the pre-Independence history of India had been undertaken by foreign architects. This included the design of New Delhi by British architects Sir Edwin Lutyens and Herbert Baker, the design of Jamshedpur by Fred Temple and later the design of Bhubhaneshwar and Gandhinagar by Otto Koenigsberger. When the Indian Board of Town Planners was constituted, it consisted of only eight members.

P.L. Verma and P.N. Thapar were given the responsibility of selecting the design team. At first there was a rush to go to Europe or America to look for suitable designers but Nehru's opposition to the idea forced them to reconsider western architects who were already working in India and were familiar with the background and conditions in the country. There was a very good rationale to that and it is expressed in Pandit Nehru's statement:

> *There is a too great a tendency for our people to rush up to England and America for advice. The average American or English town-planner will probably not know the social background of India. He will*

[25] *Ibid.*, p.25.

therefore be inclined to plan something that might suit England or America, but not so much India. [26]

Amongst the architects already working in India at that time were Otto Koenisberger and Albert Mayer. In 1949, the New York firm of Mayer, Whittlesey & Glass was selected to draw the master plan of the new city. Albert Mayer had already worked in India for some time. Initially he was posted as a lieutenant colonel in Bengal during World War II and had later on worked on some experimental rural development programs.[27] At a later stage, Matthew Nowicki, a Polish architect was added to the team to work on the design of the capital complex. In 1950, Matthew Nowicki died in a plane crash near Cairo on his way back to America. By this time the master plan had been formulated and one "sector" had been detailed. At this time the decision was taken to remove Albert Mayer from the project on the grounds that the project was too complicated for him to manage alone. Part of the actual reason was that the Indian government was not amenable to the idea of remunerating Albert Mayer in American dollars. It would mean loosing precious foreign exchange in an already weak economy. Thus, they saw this as an opportunity to replace him. [28]

A team of Indian planners was then sent to Europe to look for architects who would be ready to spend a period of three years in India working on the project. Initially, the husband-wife team of Maxwell Fry and Jane Drew were approached to design the new capital. Due to a prior commitment, Jane Drew could not leave for India immediately and she suggested the name of her old friend Le Corbusier. It was at this

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[26] Quoted in *Kalia*, p. 26. From: Brecher, Michael. (1959). *Nehru: A Political Biography.* London: Oxford University Press. P.602.
[27] *Kalia*, p.25.
[28] *Ibid.*

point that Le Corbusier was approached in his Paris office by the Indian team accompanied by Jane Drew and Maxwell Fry.

Initially, Le Corbusier was not interested in going all the way to India, leaving behind other projects, for the meager salary he was being offered. But he finally succumbed to the opportunity of implementing his urban design ideas from paper to reality. He accepted the commission on the condition that his cousin and associate, Pierre Jeanneret be included in the team. Thus, the four designers, Le Corbusier, Pierre Jeanneret, Jane Drew and Maxwell Fry, set out for India on a journey to create a new city that would be a symbol of national pride and representative of the new India.

SECTION 3

POST-INDEPENDENCE SCENARIO

Modern India, like the timeless cosmic essence (Brahman) of Vedantic philosophy, seems a montage of fragments drawn from various epoches of antiquity and ideas borrowed from remote and recent ages from abroad.

-- *Stanley Wolpert*[29]

[29] *Wolpert*, p.1.

CHAPTER 3.1

ARCHITECTURAL CONDITIONS AT THE TIME OF INDEPENDENCE

India is a peninsula in the Indian Ocean with more than half its frontiers exposed to the sea. Such a strategic geographic location has always made it vulnerable to foreign invasions. Over the course of its history, India has been invaded and occupied by diverse races and powers including the Aryans, the Greeks, the Turks, the Mughals, the Portuguese, the Dutch and the British. They have all come and gone, leaving their marks on the Indian soil. Essentially India has always been a 'melting pot' where influences from these diverse cultures have been absorbed and transformed in the cultural heritage of India. None of these foreign invasions and influences was strong enough to totally displace the indigenous. The result of this amalgamation is Indian culture, as we know it today, where these past influences are now so well integrated that it is difficult to distinguish between the indigenous and the foreign. Thus, absorbing outside influences is not new to India. The most visible foreign influences seen on the architectural scene today are those left by the Mughal and British Imperial rule. The Mughals and the British were, in fact, the last of the foreign settlers in India (with the exception of the Portuguese who were in Goa until 1961).

In India there has always been a dichotomy between the old and the new, and amazingly both have existed in tandem. An example of this is the capital of India, New Delhi where influences from several cultures co-exist with the indigenous.

New Delhi has been the capital of various empires in the course of its history. There are layers of at least seven different 'cities' from various periods that have been found in and around Delhi. What remains today is a juxtaposition of layers from all these

cities existing alongside the Imperial and the current layer. Travelling a few miles in any direction in Delhi, one can be quickly transported from one era to another in the flash of a second. Traversing the distance from Connaught Place to Chandni Chowk is one such experience of diverse vistas.

Connaught Place (Fig.3.1), designed by British planner W.H. Nicholls and architect R.T. Russell, was developed as the City Center of Delhi by the British. In design, it is purely Imperial in style with long arcades of double storied curving blocks that are white washed to match the white bungalows of the *sahebs* in the vicinity.

Fig. 3.1 Connaught Place, New Delhi

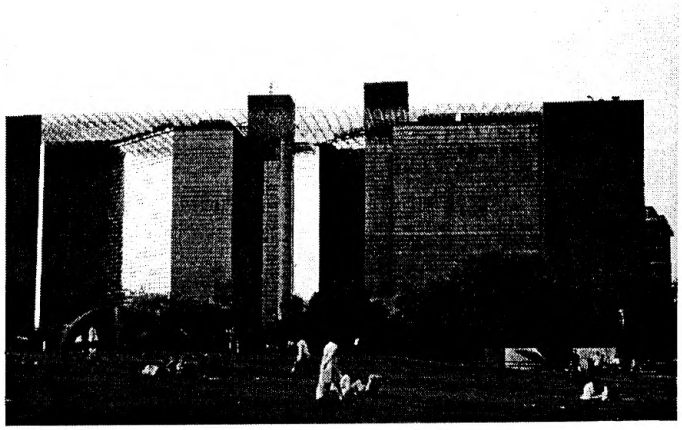

Fig. 3.2 Glass and Steel towers dominate the landscape of Connaught Place today

Connaught Place today has been expanded to accommodate the growing needs of the bustling capital city. It has become a virtual concrete jungle with a towering skyline of concrete glass and steel high-rise buildings (Fig.3.2). In one corner, the scientific and creative genius of King Jai Singh is seen in 'Jantar Mantar', the 18th century observatory built by him (Fig.3.3). It is now overshadowed by the tall vertical symbols of modern age. Mingled with this is the harsh reality of the urban poor seen in fervent street peddlers who have their goods laid out along the pavement or in make-shift wooden shacks. The

journey towards the old walled city of Delhi, Shahjahanabad, is a transformation from white to red (Fig.3.4).

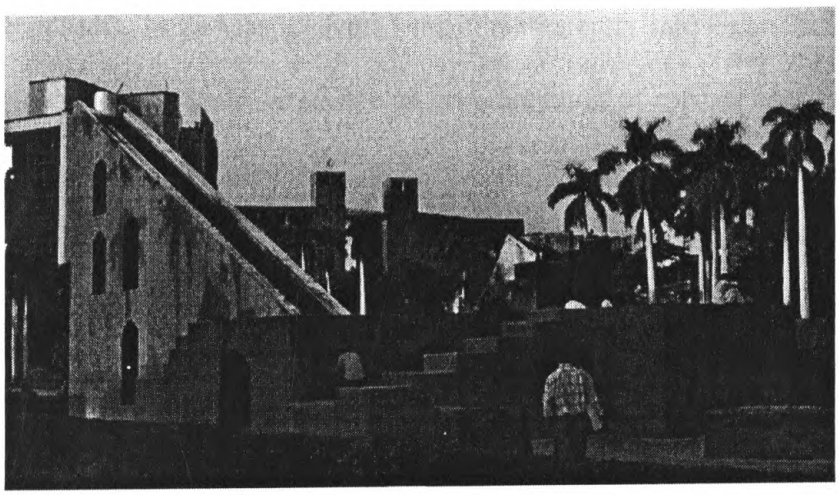

Fig. 3.3 Jantar Mantar is overshadowed by high rise buildings in its vicinity

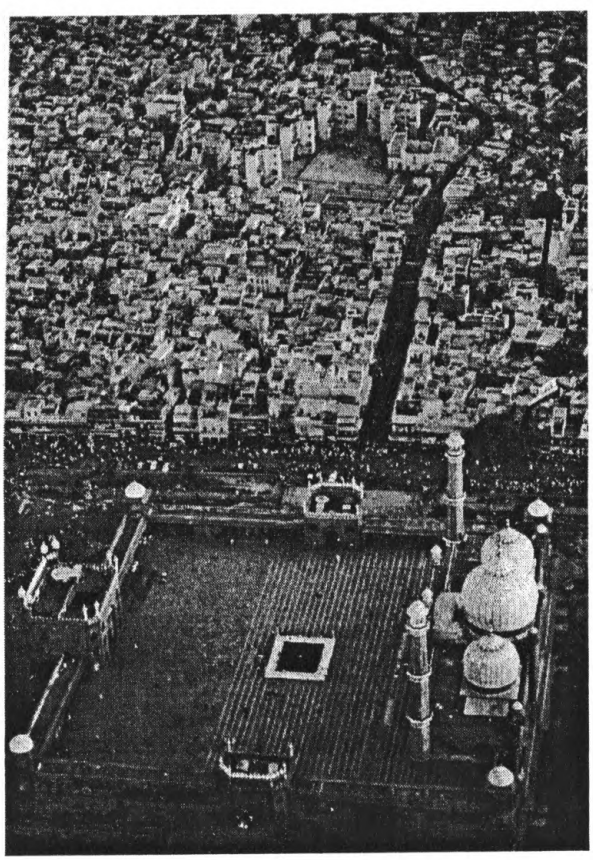

Fig. 3.4 The old walled city of Shahjahanabad with the Jama Masjid in the foreground

This old city reveals the splendor of Mughal India, with its numerous gateways, the imposing red sandstone walls and ramparts of the Red Fort and the bulbous dome of the biggest mosque in India, Jama Masjid. Jama Masjid marks entry into Chandni Chowk where all of a sudden one is transported into an intricate maze of narrow congested streets that are a confusing but interesting mix of residential and commercial spaces (Fig.3.5). This is markedly different from the wide tree lined avenues of Central Delhi. Thus, there is a complex intermingling of various layers that are represented by the architecture that survives today. Like Delhi, most old cities in India are a result of accretion over time with several layers juxtaposed in an unexpected harmony.

Fig. 3.5 Chandni Chowk, a mix of commercial and residential places in the heart of Old Delhi

The commissioning of Chandigarh was an act of resurgence not only for the people of India but for its architecture as well. With the nation was free to choose its direction, but after so many years of following the lead of foreign influences it was not easy to express an independent style. There was no particular 'Indian' style prevalent at

that time and there were several directions that architects could follow. According to Vikram Bhatt and Peter Scriver, the last phase of the classical Indian architecture fell into decadence and eclecticism in the eighteenth century with the consolidation of European colonial interests in India.[30]

Moreover, at the time of Independence, there were only a few hundred trained architects in the country, most of them trained by the British. Prominent amongst the architectural educators at that time was Claude Bately, who was the head of the Sir J.J. School of Art in Bombay. He was actively involved in propagating architecture that would merge traditional Indian architecture with its European counterpart. During the last part of British Rule in India there was an increasing search for such an 'Indo-Saracenic'[31] style as was represented by the architecture of Edwin Lutyens and Herbert Baker for Imperial Delhi. According to Tillotson,

> *...most remarkable component of the new enthusiasm, however, was the development in the last quarter of the century of a new style for Imperial architecture in India. The hegemony of the classical had already been broken by a rise in the popularity of the Gothic, but now British architects in India began to examine the Indian tradition and to attempt to adapt the Indian styles to British Imperial buildings. These experiments in what has generally been called Indo-Saracenic architecture, include Islamic-style railway termini and university colleges.*

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[30] Bhatt, Vikram & Peter Scriver. (1990). *After the Masters*. Ahmedabad: Mapin Publishing Pvt. Ltd. p.13.

[31] Indo-Saracenic architecture has been defined by Tillotson as the attempt to adapt Indian style to British Imperial buildings. The term was originally coined by James Fergusson to refer to what is generally known as 'Indo-Islamic' architecture, the blend of Indian and Islamic design ideas.
Tillotson, G.H.R. (1989). *The Tradition of Indian Architecture. Continuity, Controversy and Change since 1850*. New Haven: Yale University Press. Pp. 37-38 and pp. 46-56.

Such an Indo-Saracenic architecture was not favored by those who associated the indigenous with backwardness. A reason for such an attitude was the affect of English education on the masses of India. According to Tillotson,

> *The British Government's policy of Westernizing Indian society, and expressions of contempt for Indian civilization made by members of the ruling race, both encouraged in the educated Indian a scepticism about his own cultural heritage...The same forces encouraged him instead to espouse Western standards of civilization: to want to build, for example, in classical styles.*[32]

The Classical and Indo-Saracenic styles were accompanied by a period of Gothic Revival, which was introduced by the British in the mid-nineteenth century. Gothic, like the traditional architecture of India, relied heavily on ornamentation for character and was thus easier to incorporate in the Indian setting. This 'Indo-Gothic' architecture was most widely used in the architecture of Princely India and for the design of colonial bungalows. Buildings in this style relied on intricate craftsmanship revealed in trefoil arches, clustered columns, elaborate carvings and surface ornamentation (Fig.3.6).

At the end of the British Rule in India, it was the Indo-Saracenic architecture that was most dominant. It served the dual role of representing, on one hand, the Indian style and on the other the Imperial style of the British. Numerous buildings throughout India bear testimony to this, including prominent government buildings (Fig.3.7& 3.8) in all four metropolitan cities of Delhi, Chennai (Madras), Mumbai (Bombay) and Calcutta.[33]

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[32] *Ibid.*, p. 40.

[33] Examples of this style are: Victoria Terminus in Mumbai by F.W. Stevens, Victoria Memorial Hall in Chennai by Henry Irwin and Mayo College in Ajmer by Charles Mant. For details on this style refer to the book by Tillotson.

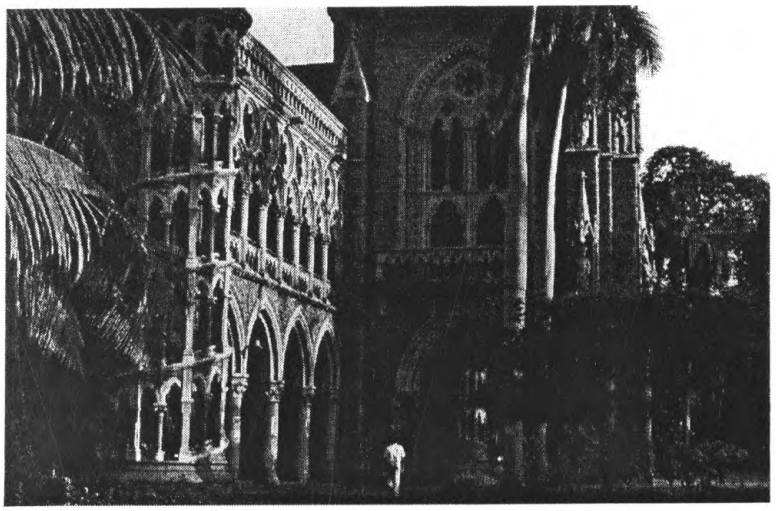
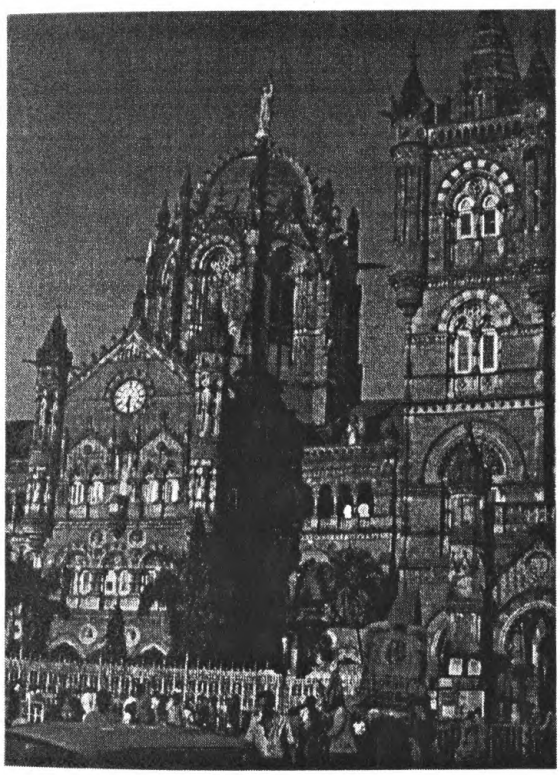


Fig. 3.6 The Bombay University Library was an example of the Gothic Revival in British India



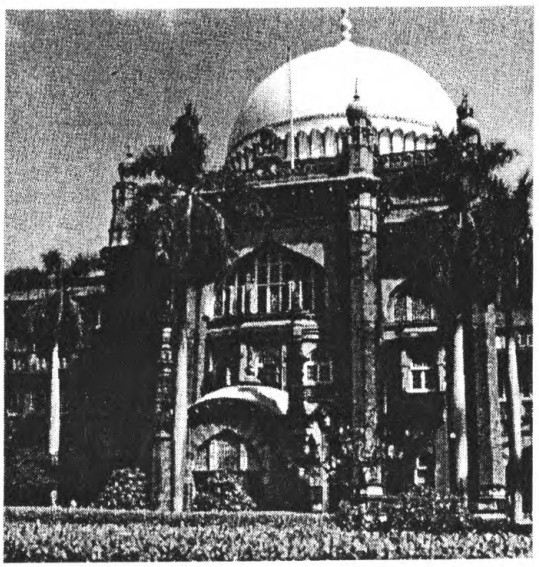


Fig. 3.7 The Victori Terminus in Bombay (Mumbai) was an attempt at transition from Gothic Revival to the Indo-Saracenic style.

Fig. 3.8 The Prince of Wales Museum in Mumbai, by George Wittet, an example of the Indo-Saracenic architecture in British India.

Another important inheritance from British Rule was the Central Public Works Department (CPWD). Most of the architectural work under the British was done by government engineers in the CPWD. The CPWD was a bureaucratic organization controlled by British military engineers. It consisted mainly of civil engineers with architects hired as consultants on some projects. The CPWD was more inclined towards functionalist architecture with marked Imperialist tendencies. The organization continued to function even after Independence and is still strong at city level planning. The CPWD continued to follow most of the building codes and regulations inherited from the British. It undertook the construction of most of the public housing and government projects that were commissioned after Independence. To a great extent it was responsible for leading the country towards modern architecture as represented in the drab concrete frame and brick in-fill public housing that appeared everywhere during that period.[34]

Another factor responsible for lending character to the Post-Independence architecture of the country was a regular inflow of architects trained in Europe and America, who brought Western ideas and techniques with them. Such ideas were later given impetus by the works of prominent Western architects like Le Corbusier and Louis Kahn, particularly those in Chandigarh and Ahmedabad. The appointment of Le Corbusier for the design of Chandigarh, was thus an important decision that determined not only the fate of the city but also the future of Post-Independence architecture in India.

It is important at this point to outline the alternatives facing the architects of the country at the time of Independence, which also represent the directions the design of Chandigarh could have taken. Some of these have been identified by Jon Lang and Desai as:

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[34] *Bhatt & Scriver*, p.175.

1. Nationalism
2. Regionalism
3. Indianization/ De-Europeanization
4. Traditionalism
5. Revivalism
6. Modernism, Popular Taste and Avant-garde

1. Nationalism

Lang and Desai describe Nationalism as a "devotion to one's own country, the striving for intellectual, political or economic independence by a people and the establishment of a geographically bounded community."[35] In India Nationalism was a reaction to the British rule coupled with the need to unify the country amidst the diversity inherent in its being. The Nationalist spirit had a profound affect on the architecture of post-independence India. There were several ways in which it manifested itself in the architectural context. Ashok Mitra identified them as:

- striving for victory
- isolationism
- avoiding change.[36]

Striving for victory implied rising above the Imperialist past by hastening progress and evolving a unique self-identity. Isolationism meant rejecting the rules of Imperialism and reverting to the traditional, which was deemed to be better. And finally,

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[35] *Lang, Desai*, et al., p.7.
[36] Mitra, Ashok. (1962). *The Forces Behind the Modern Movement.* In *Lalit Kala Contemporary*, June 1962, No.1.

by avoiding change, the pre-Colonial past was clung on to. The security and pride of the old was sought as an alternative to the new.

Generally, Nationalism was a move to reject the colonial influences and to find inspiration, security and glory in the past, the goal being to establish a unique and 'superior' identity.

2. Regionalism

Regionalism in architecture can be broadly defined as "a product of place and time".[37] Regionalism emphasizes on local traditions and crafts and seeks solutions in the vernacular. In the West, regionalism was borne out of a rejection of the International Style and Modernism, whereas in India it was an offshoot of the rejection of Colonialism.

Before the British came, India was a loosely connected agglomeration of different princely states and kingdoms. The British rule united the region as a nation for the first time. India has not only physical variations from region to region but also ethnic, cultural, social and linguistic diversity. Different regions of the country have strong roots in traditions and social customs that are unique to that region. Different parts of the country then resorted to native architecture and sought inspiration in the regional context. Thus, the Regionalist movement complimented the Nationalist movement at that time.

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[37] Jadhav, Rajratna U. (1998). *Eastern Regionalism and Indian Identity: A Case Study of Charles Correa's Inter-University Center for Astronomy and Astrophysics & Raj Rewal's Central Institute of Educational Technology*. M.Arch. Thesis. Kansas State University. P. 20. For details on Eastern Regionalism and its implication in the architectural scene in India, refer to this thesis.

3. Indianization/ De-Eurpoeanization

Lang and Deasi describe the process of De-Eurpeonization as shrugging off the European influences that were generated as a result of Colonialization by the British, the Portuguese, the Dutch and the French. This De-Europeanization is also termed as 'Indianization'. It was based on the view that various institutions and their modes of operation should be based on Indian traditions. The aim was to give the country an identity different both from the Colonial past and from a universal architecture.

4. Traditionalism

Traditionalism refers to the use of past social structures, past architectural patterns, and the past processes of change in the society.[38] Ideally, traditionalism should refer to the application of traditional ideas in light of the present conditions. Traditional architecture in India dates back to the architecture of the '*Manasara Silpasastara'*, the architectural treatises laid out in Vedic times. The use of these particular principles has gained new-found enthusiasm in architectural circles today under the label of '*Vastushastra*'. In fact, in popular architecture, *vastushastra* has been exploited and distorted to such an extent that it barely resembles the original in spirit and meaning. It has become more of a fad than a tool for understanding architecture or as a design tool.

At the post-Independence stage, traditionalism was a popular idea and in fact an easy recourse for most architects. It was also a very practical solution considering the availability of cheap labor and craftsmen skilled in traditional styles and modes of construction. On the whole, traditionalism signified continuity.

5. Revivalism

Revivalism pertains to the application of ideas from the past. It believed that recreating the glorious past such as the Golden Age of the Gupta Period would solve the country's problems. According to Lang and Desai, there are three ways in which Revivalism manifested itself in the architecture of post-independence India.[39]

- In design production: The traditional way of building with the *mistri* (the master builder) and the *silpin* (the craftsman) was recreated much like the Arts and Crafts movement in Britain, Europe and the United States of America.
- In design procedures: It advocated that architects should try to understand the thought process and spirit of the architecture of the past instead of imitating it in appearance.
- Revival of aesthetics: It aimed at merging the past styles with contemporary technology.

Generally, the aim of the revivalist movement was to resurrect symbols from the Hindu past of the country, which had been pushed into relative oblivion by successive foreign rules, first by the Turks, then by the Muslims and in the end by the European Colonists.

6. Modernism, Popular Taste and Avant-garde

At the time of Independence, 'modernism'[40] in India was synonymous with Westernization. Anything that rejected the traditional and was Western looking was

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[38] *Lang, Desai*, et al., p.13.
[39] *Ibid.*, pp.16-18.
[40] The terms 'modernism', 'avant-garde' and 'kitsch' have been explored in depth by Calinescu who refers modernism as pertaining to the present times, avant-garde as being "conscious of being in advance of its own times" (p.104) and kitsch is associated with bad taste, banality, repetition ands eclecticism. Calinescu, Matei. (1987). *Five faces of Modernity*. Durham: Duke University Press.

labeled as being 'modern'. For some, modernism was a sign of progress. It was more of a commercial trend and along with its offsprings, 'avant-garde' and 'pop-Art', became a popular and easy recourse for most architects. The application of modernism was to some extent hindered by the lack of adequate technology and finances and very soon it degenerated into 'kitsch'.

CONCLUSION

Post-Independence architectural culture in India was confused. To make matters worse, there were only about two hundred qualified architects in the country and half of them were based in Bombay and most of them were marginalized by the state and central Public Works Departments and by the bureaucracy of Indian society. There were only six architectural schools in the country and they continued to follow a program based on the Royal Institute of British Architect's framework.[41] This added to the confusion of selecting an appropriate style for the new nation and seeking an identity in an increasingly global world.

The architects were, thus, caught in a cross-current of 'modern' and 'traditional', a dilemma from which they have not recovered even today. It was under such conditions that Chandigarh was conceived.

[41] *Lang, Desai, et al.*, pp.190-91.

SECTION 4

MAYER'S MASTER PLAN OF CHANDIGARH

I feel in all solemnity that this [Chandigarh] will be a source of great stimulation to city building and re-planning in India. But I also feel that it will be the most complete synthesis and integration in the world to date of all that has been learned and talked of in planning over the last thirty years, but which no one has yet had the great luck to be allowed actually to create. Yet I feel we have been able to make it strongly Indian in feeling and function as well as modern.

-- *Albert Mayer, letter to Pandit Nehru, May 1,1950*[42]

[42] *Kalia*, p. 23.

CHAPTER 4.1

THE MAYER PLAN

INTRODUCTION

The discord as to the direction Chandigarh was to follow was partially resolved with the selection of the architectural team. As is with any design effort, the personality and convictions of the individual designer are one of the prime factors shaping the end product. Thus, in order to better understand the design, it is necessary to outline a profile of the design team, placing emphasis on its urban design ideas.

In 1949, the American firm of Mayer, Whittlesey & Glass was selected to prepare the first master plan of Chandigarh. Mayer, Whittlesey and Glass was a prominent architectural and town planning firm from New York City. Albert Mayer was the principle designer and was well known in city-planning circles in the United States.

Albert Mayer (Fig. 4.1) was born in 1897 and graduated as a civil engineer from the Massachusetts Institute of Technology in 1919. He began his career as a civil engineer in New York City and it was only later that he became a registered architect. His interaction with architects and planners like Lewis Mumford, Clarence Stein and Henry Wright fostered his interest in housing and community issues.[43] He was actively involved in issues of urban renewal and was an advocate for the improvement of public housing in the United States. In his writings he talked about improving the environment, visual appearance, space conditions and the legislative framework for public housing.[44] He was a strong proponent of community life. In his book '*The Urgent Future*' he outlined

[43] Emmentt, Robert C. (1977). *Guide to the Albert Mayer Papers on India in the University of Chicago Library*. The University of Chicago: Committee on Southern Asian Studies & South Asia Reference Center. p.1.

problems that modern cities were facing and proposed several community improvement and renewal strategies focusing on low-income housing.[45]

Fig. 4.1 Albert Mayer advising Indian Government officials

His ideas were influenced to a great extenmt by Ebenezer Howard and the Garden City movement, which he refers to several times in '*The Urgent Future*'. He was particularly impressed by Clarence Stein and Henry Wright's 1929 Radburn super-block (Fig.4.2) in New Jersey, which was "unpierced by through-traffic; [had] complete separation of pedestrian and motorcar; internal social-recreational park on land gained by the cluster-principle."[46] The Garden City design and the Radburn block had inspired him and it is clearly reflected in the Chandigarh super-block.

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[44] Mayer, Albert. (1964). *Architecture as Total Community: The Challenge Ahead.* Architectural Record. April 1964. Pp 169-178.

[45] Mayer, Albert. (1967). *The Urgent Future. People, Housing, City, Region.* New York: McGraw Hill Inc.

[46] *Ibid.*, p. 78. Mayer refers to Radburn in an article on Chandigarh too: Mayer, Albert. (1950). *The New Capital of Punjab*. Journal of the AIA. October 1950. Pp. 166-175.

The Super-block neighborhood
A. *Internal block parks in each superblock*
B. *Pedestrian underpass between blocks (see photo)*
C. *Elementary school and playground*
D. *Community center, management, shops*
E. *Typical cul-de-sacs or deadend streets*

Fig. 4.2 The Radburn Superblock by Clarence Stein & Henry Wright influenced Mayer in his design of Chandigarh.

Albert Mayer's selection for the design of Chandigarh was not a random choice. He had been working in India for quite some time. His first experience in India was as an army engineer during World War II when he built airfields in Bengal. It was at that time that he became interested in the life and culture of India. Being a designer sensitive to the quality of life around him, he came up with proposals to improve the quality of life in rural communities in India. In 1946, he became officially involved in rural development projects in the north-eastern Province of Uttar Pradesh. As an architect and urban planner, he undertook several projects in India. Some of them were—preparation of master plans for Kanpur, Greater Bombay and Delhi. He also designed buildings for the

Allahabad Agricultural Institute (Fig. 4.4) and the Standard Vaccum Oil Company in Bombay.

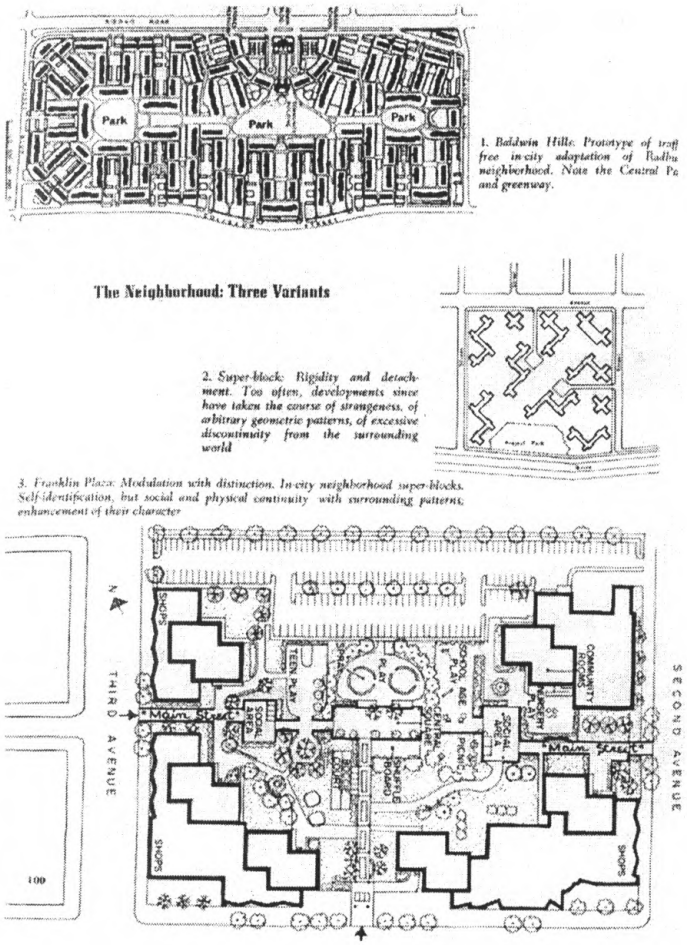

Fig. 4.3 Three types of Neighborhood blocks analyzed by Albert Mayer in '*The Urgent Future*'

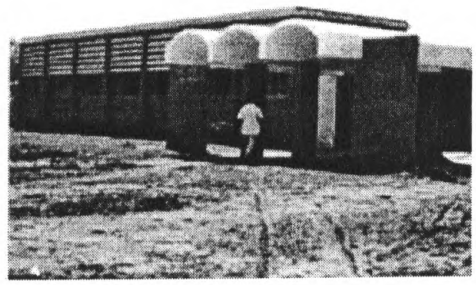

Fig. 4.4 The Allahabad Agricultural Institute designed by Albert Mayer.

Fig. 4.5 Matthew Nowicki.

Mayer also had the opportunity to meet Pandit Nehru on several occasions during his work in India. It was Pandit Nehru who had recommended him for the Chandigarh project. Having been granted the project, Mayer assigned a team experienced in varied fields. The team consisted primarily of Albert Mayer along with his partners in practice, Julian Whittlesy and Milton Glass. The rest of the team in, Mayer's words, consisted of "Clarence Stein you all know, all-round expert and spiritual force. Ralph Eberlin, whose

quick and incisive mind goes far beyond utilities and roads and site engineering. Matthew Nowicki, who has a rare architectural talent and lightning mind. Clara Coffey, who knows much more than landscaping."[47] Thus, from the very beginning he had a holistic view of the project with the goal of integrating all of the aspects of design into the creation of Chandigarh.

Explaining his design intent, Mayer stated their first goal to be the creation of a beautiful city. Second was "to create a sense of pride in the citizen, not only in his own city, but in India, its past and its potential imminent future."[48] Mayer's statements reflect empathy towards Indian traditions, boldly looking towards the future of modern India. Mayer makes one especially profound statement in this respect:

> *We are seeking to build a city not in our idiom, not the city of bold-winged engineering and cantilevers, which India's developed resources do not justify, but a city in the Indian idiom fused with our own simplicity and functional honesty. Frankly we are trying not so much to express ourselves or obtrude ourselves, but to develop this capital city as modern self-confident Indians would if they were such a group...Note we are not thinking in terms of Indian archaeology, but of modern India.*[49]

Matthew Nowicki began working with Mayer on the city plan of Chandigarh in the winter of 1950. Nowicki (Fig. 4.5) was a Polish architect working in the United States and was brought into the project by Clarence Stein, a mutual friend of Mayer and Nowicki. Lewis Mumford in his articles on Nowicki describes him as a prolific architect, who had the potential of becoming an outstanding architect, had his career not been cut short by the tragic air-crash in 1950. In Nowicki he saw the union of Le Corbusier and Frank Lloyd Wright with the added element of sympathy and passion for the general

[47] Mayer, *The New Capital of Punjab*. p.172.
[48] *Ibid.*, p.173.

masses. "To nature, as interpreted by Wright, to science and machine as interpreted by Le Corbusier, Nowicki added the missing term—man." [50]

Nowicki had received his architectural education in the Warsaw Polytechnic and like most students in Europe at that time, was influenced by the works of Le Corbusier and Auguste Perret. In 1947, he met Frank Lloyd Wright and was deeply influenced by his explorations in Organic Architecture. During World War II, Nowicki was in Warsaw and the horrors of the war affected his sensitivity as a person as well as an architect. It resulted in distrust of the machine and a resurgence of national spirit and devotion to his country. The war also led to a subsequent search for national and regional elements in architecture and the urge to follow a more humanistic approach towards design based on increased compassion and sympathy towards mankind. His ideas are represented in his words quoted below.

> *The study of the well-being of contemporary man, which has been introduced into the language of architecture continues to be the inspiration for our work but this time the quality is differently analyzed. It is no longer 'the machine to live in' that stirs our imagination. It is the eternal feeling of a shelter to which we subordinate our creative ideas.*[51]

Thus, Nowicki was a strong advocate for a more humane culture, a designer with empathy towards his fellow human beings. The first master plan of Chandigarh was thus a combination of the design ideas of Albert Mayer and Matthew Nowicki, both of whom wanted to improve living conditions in modern day cities and make them more amenable as places to live in.

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[49] *Ibid.*

[50] Mumford, Lewis. (1954). *The Life, the Teachings and the Architecture of Matthew Nowicki.* In *Architectural Record*, Sept.1954, p.154.

THE PROGRAM

The first phase of Chandigarh was to be designed for a population of 150,000 with scope for future expansion. The area available was around 8000 acres. Mayer first visited the Chandigarh site on January 11, 1950. He found the site, with the backdrop of the Shivalik Hills and the lush green mango groves, very picturesque and believed that this aspect of the site would be fundamental in giving character to the new city.[52]

The program required:

1. A city plan with road layout and land use pattern.
2. Detail plans of the capitol complex consisting of the legislative assembly building (the parliament), the governor's palace, the high court and the secretariat.
3. The design of the main business area and the residential neighborhoods.
4. A landscape plan specifying the parks and squares and the design of the main avenues.
5. A description of the architectural controls.

Mayer's proposal was a fan-shaped city designed to fit between two existing rivulets, Patiali Rao and Sukhna Choe. It deviated from a rigid grid-iron plan by the use of a curving network of roads, which according to Mayer, was more picturesque than a series of long, straight roads. The Capital Complex was located at the upper edge of the city, with its buildings being reflected in an artificial lake created by damming the Sukhna Choe. The business district was placed in the center of the plan and the industrial area was to the east. New growth was designated to the south of the first phase.

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[51] Nowicki, Matthew. Quoted in: Mumford, Lewis. (1954). *The Life, the Teachings and the Architecture of Matthew Nowicki.* In *Architectural Record*, June 1954, p.148.

Mayer's plan was based on the neighborhood concept. Like the Radburn plan, the neighborhood consisted of super-blocks, each of which was a self-sufficient entity with all essential services, shopping, recreation and public facilities provided within the block. Defending the neighborhood scheme, Mayer remarked:

> *The neighborhood concept is...even more [valuable] in India where so many people are villagers at heart...The nature of our neighborhood is intimate. The local shopping center preserves, as far as we can [be] consistent with orderly development to do so, the excitement and gaiety of the bazaar—the people undisturbed by traffic in their social preoccupation with shopping and visiting.*[53]

Each neighborhood super-block was approximately 3000 x 1500 feet with a maximum area of around one hundred acres, designed to house approximately 1000 families. The basis of the scheme was a 'district', each of which was a combination of three neighborhood super-blocks, which in total would house 3500 families. Each district was like a small town complete with a town square, public buildings and amenities. No heavy traffic was allowed within the super-block and was restricted to the curved network of major roads running around its periphery. The internal traffic network was made of footpaths, bicycle tracks and roads for bullock-carts and light vehicular traffic. Thus like the subsequent plan by Le Corbusier, there was a separation of traffic. The traffic network was an important issue in town planning at that time with the advent of motor car and traffic with varying speeds. Although there would not have been much motorized traffic in Chandigarh at first, it was anticipated.

Each super-block had parkland in the center with the schools sited within it. The shopping area was at the south end of the block. The middle block in the district was less

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[52] *Kaila*, p.33

dense and would house only 800 families. It was devoted more to community facilities with the high schools, the major shopping areas and the health and recreation facilities.

Mayer's plan was, in essence, meant to achieve both beauty and economy. He tried to give the plan a certain 'Indianess' by providing elements like pedestrian paths and bazaars with provision for small handicraft workshops and small-scale industries. These features coupled with community living would provide a village like environment for the neighborhoods of the city.

The master plan was based on a strong division on the basis of income level. The design proposed three kinds of blocks: U-- upper income (Fig. 4.6), M-- middle income (Fig. 4.7) and L-- lower income blocks. The plan though functional lacked the interest, vitality and diversity that are typical of Indian cities. It lacked a strong symbolic quality that was of primary concern to the patrons. It was in the design of individual buildings, at a later date by Nowicki, that such elements were projected.

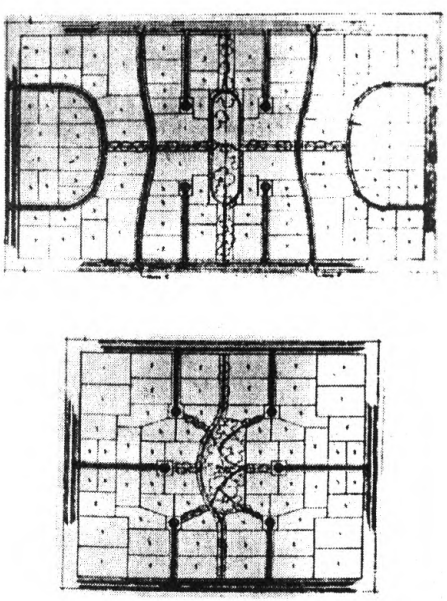


Fig. 4.6 Plan of Typical Upper Income Block by Albert Mayer.

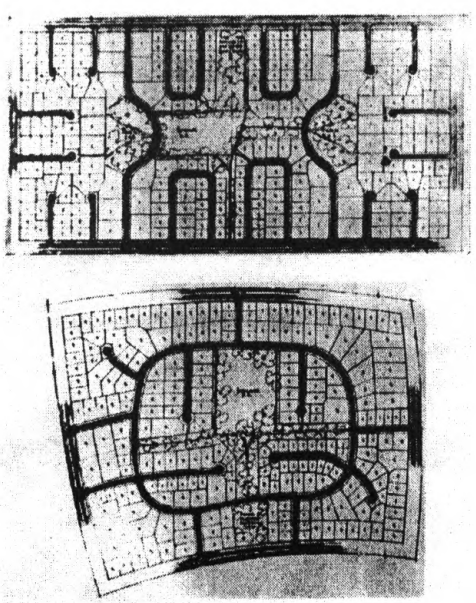


Fig. 4.7 Plan of Typical Middle Income Block

[53] Mayer, quoted in *Kalia*, p.52

CHAPTER 4.2

NOWICKI'S PROPOSAL

After reviewing Mayer's proposal for the new city, Nowicki worked on an alternate master plan that he called the 'leaf-plan' (Fig. 1.3). The organization of the city was like a leaf with the stem forming the central commercial axis of the city and the veins forming the traffic network. The capitol complex was still at the top of the plan but the university was placed above and to the west of the capitol complex. The industrial area was placed at the extreme south of the city and was sufficiently distanced from the residential blocks.

The design was based on a division of the city into two functions, the everyday function that was "dwelling and work" and the holiday function that corresponded to "recreation". According to Nowicki, the everyday function determined the city's pattern and texture but it was the holiday function that gave character to the city. The capitol complex was a part of the holiday function. It was here that the city achieved a monumental character. The capitol complex was designed as an imposing group of buildings placed against the backdrop of the hills. The design scheme was based on a cross axis and had images recalling monuments from ancient Indian architecture. The buildings (Fig.4.8, 4.9& 4.10) themselves were of great symbolic importance to the city.

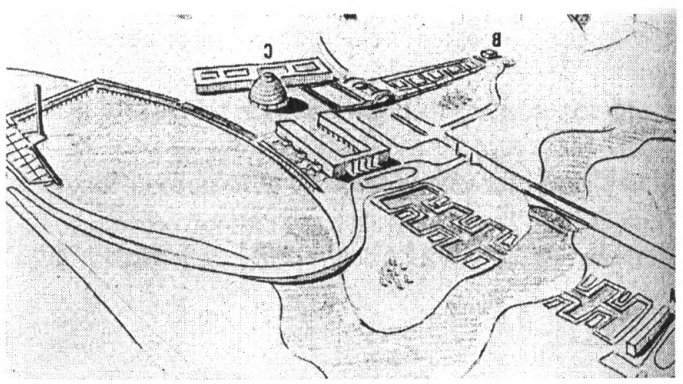


Fig. 4.8 A view of the Capitol Complex by Nowicki

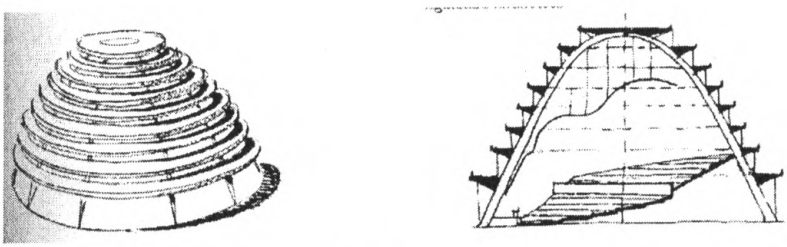


Fig. 4.9 The Assembly Building design.

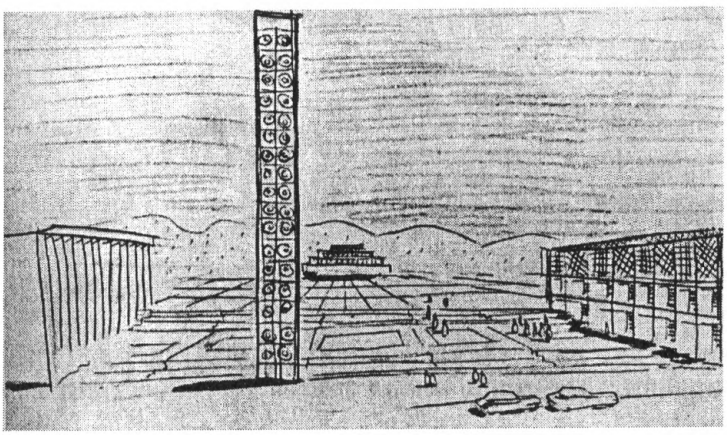


Fig. 4.10 The Capitol Complex by Nowicki.

Like Mayer, Nowicki also believed in beauty and economy coexisting in the city. But for Nowicki the curving of the road network or irregularity in the plan was not a solution to providing beauty or variety in the city. According to him planning was always a modular problem where the goal was to provide order. Nowicki's leaf plan had a clear geometric order in the layout of the main network of roads. It was in the internal layout and details that interest and diversity was provided, none of which was without reason. The planning unit was still a neighborhood with the super-block (Fig. 4.11) now consisting of a combination of apartment blocks and low-rise housing. These were later replaced by single storied and three-storied housing, considering the resources available,

to achieve economy in building. The middle of the block was parkland with the schools and the temple placed within it. The shopping area was at the lower edge of the block.

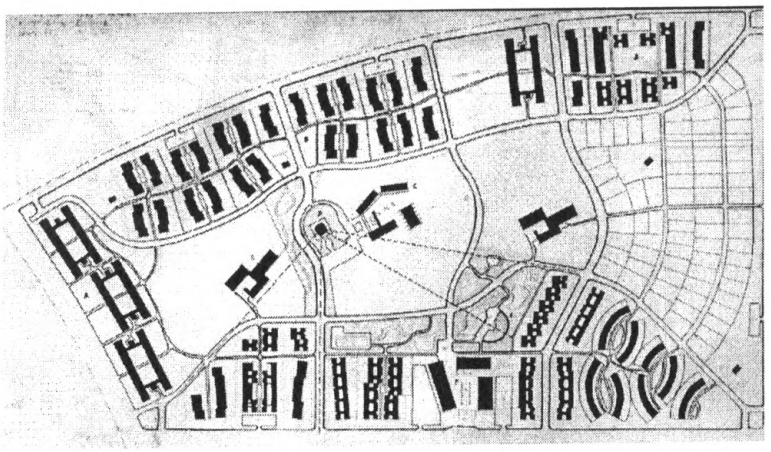


Fig. 4.11 The superblock by Nowicki.

Nowicki's design for housing was particularly interesting with a marked use of traditional elements. A right amount of diversity was provided by introducing variation in small details like curving pedestrian paths, grouping of houses, use of setbacks and introducing water bodies within the residential areas. The houses (Fig. 4.12, 13 &14) with their internal courtyards, clustered layout, and decorated surface treatment, alluded more to traditional Indian housing than most of the present day housing in Chandigarh. The design relied for an Indian character, not on a direct imitation of traditional ornamentation, but on reinterpreting it in a new way. Elements like *jaalis*[54] and *chajjahs* were expressed in a new way. The houses were designed in brick to reduce cost. The layout of housing units received special attention. Nowicki proposed them to be arranged both in rows and clusters. Some of Nowicki's sketches show houses clustered around an open space, much like the space clusters found in traditional Indian cities.

[54] A '*jaali*' is a perforated screen in stone or in brick. It is used to being in light and air while keeping out the harsh rays of the sun. A '*chajjah*' is a cantilvered sunshade provided over door or window opening.

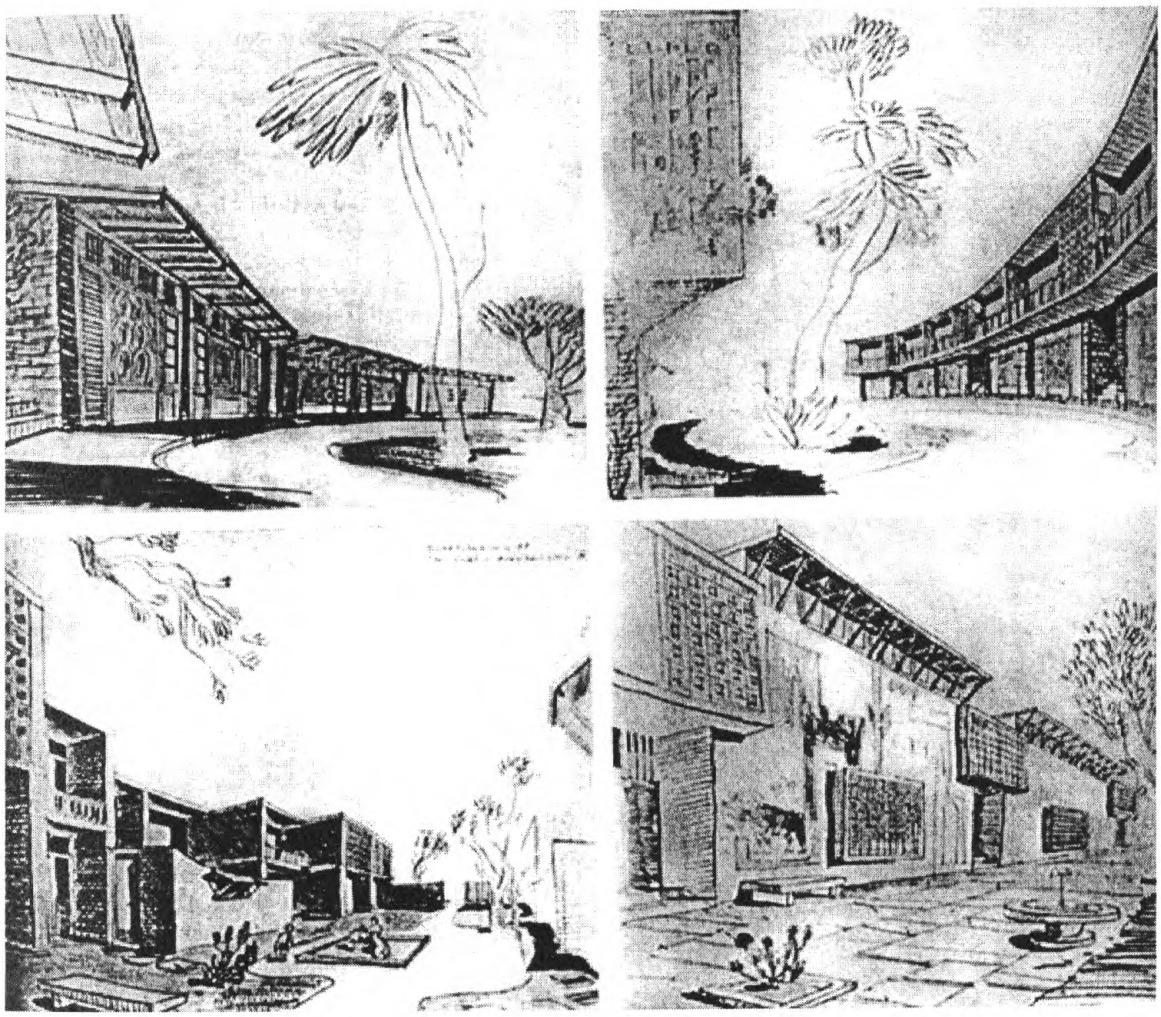


Fig. 4.12 Housing designs by Matthew Nowicki for Chandigarh.

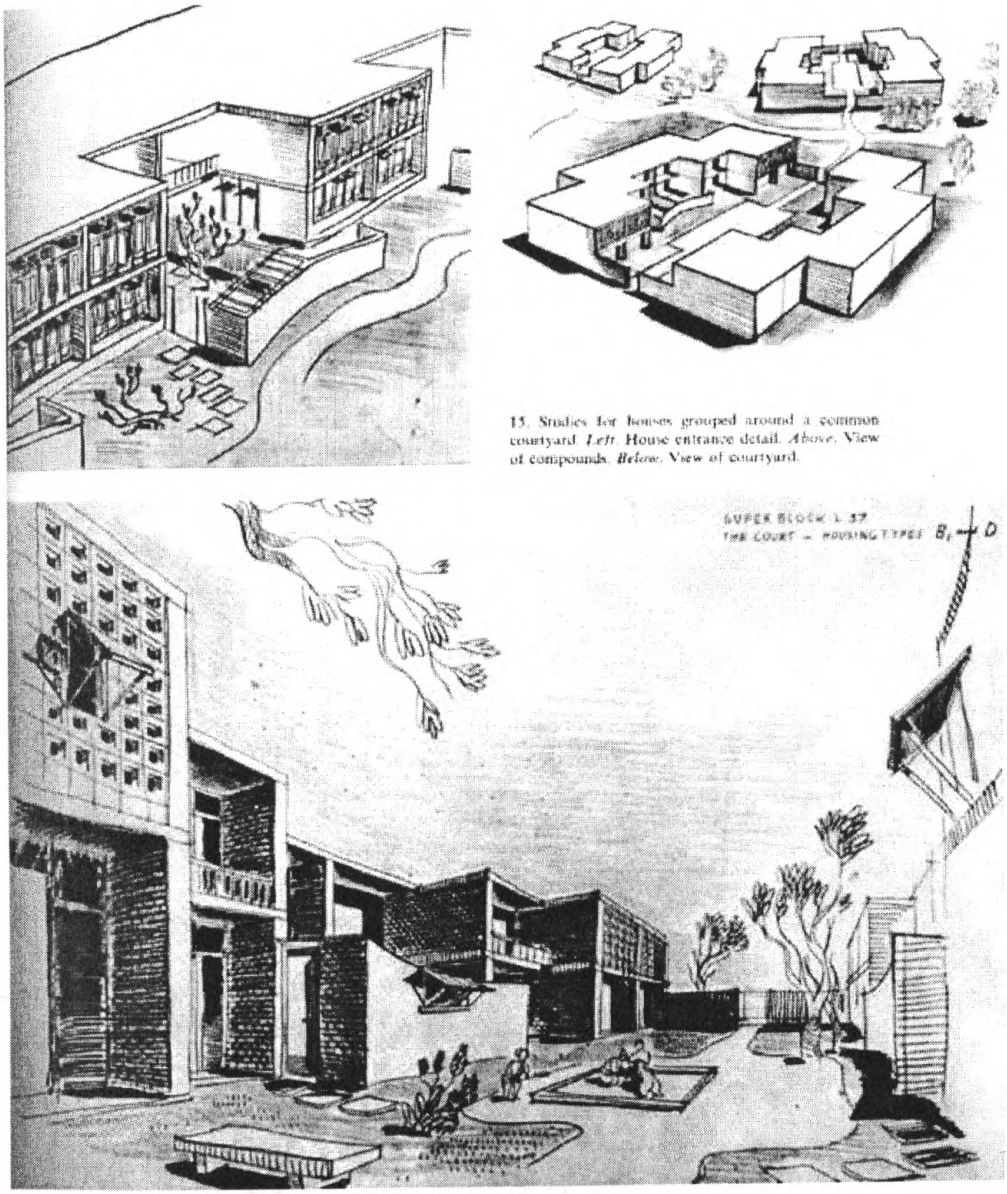
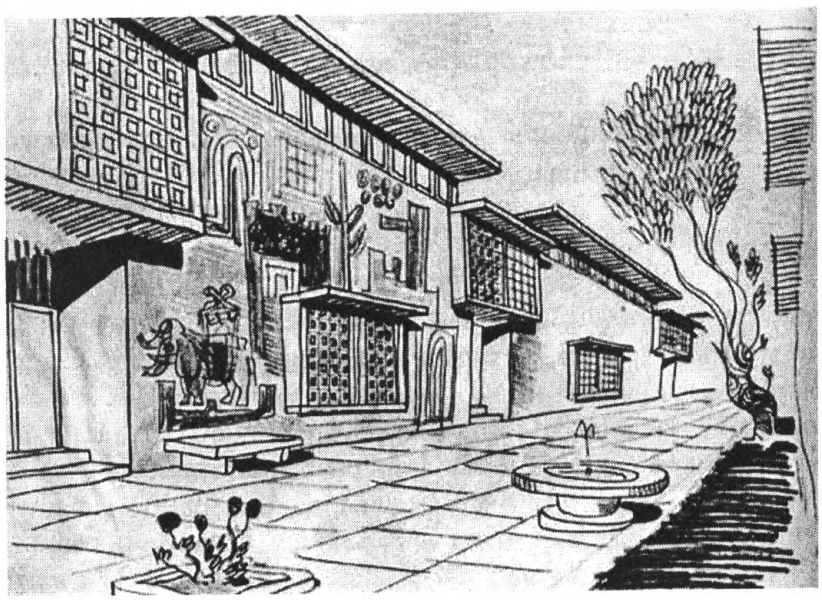


Fig. 4.13 Several prototypes for housing were studied by Nowicki, based on an informal street layout and incorporating elements important for community life.



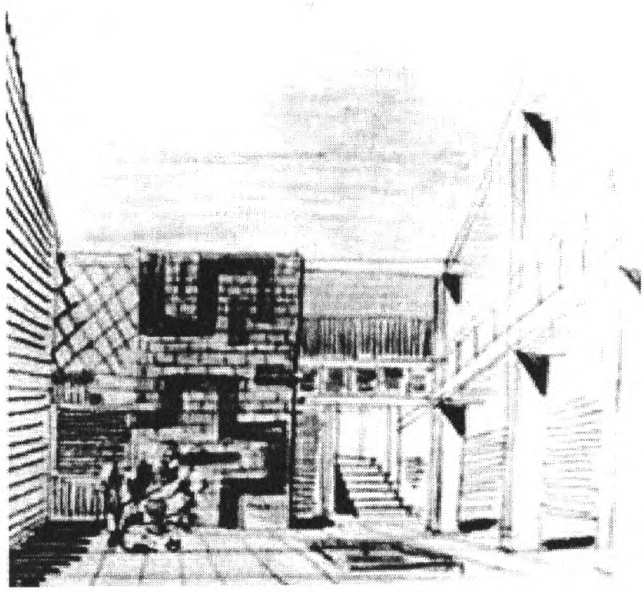


Fig. 4.14 Traditional elements such as jaalis, courtyards and decorative motifs were used to give the housing a certain 'Indianess'.

The housing designs show a marked variety in both layout and visual appearance. The sketches also show a great deal of community life occurring in the streets, which were narrow and winding. Relationship between housing blocks was considered of importance. According to Nowicki:

> *It is the result of relations between the buildings which provide a frame for a particularly interesting view where color and silhouette are seen in shade...The change of those views, none of them large scale within our residential area, should follow a well-planned sequence...Human beings seem to depend on the emotional quality of space as much as on sanitary factors of light and air. The fact explains why people become more attached to crowded and seemingly uncomfortable conditions in many cities, and remain cold to some modern developments, sanitary as they may be.*[55]

Nowicki's work was focused on a search for over-all relationships, economy, visual appeal and functionality. To sum up his intentions, Nowicki quotes Lord Krishna's words from the Bhagwad Gita, "Indifferent to pleasure and pain, to gain or loss, to conquest or defeat, thus make ready for the fight...as do the foolish, attached to works, so should the wise do, but without attachment, seeking to establish order in the world."[56]

In 1950, Matthew Nowicki died in a plane crash, leaving his design schemes unrealized. Subsequently Albert Mayer was removed from the project, with the promise that his master plan for Chandigarh would be retained. A new design team was selected and entrusted with the design of Chandigarh. It is interesting to speculate as to what character the city would have taken had Nowicki not died a premature death and had the Mayer team been retained for the project. Nevertheless, the contribution of this design

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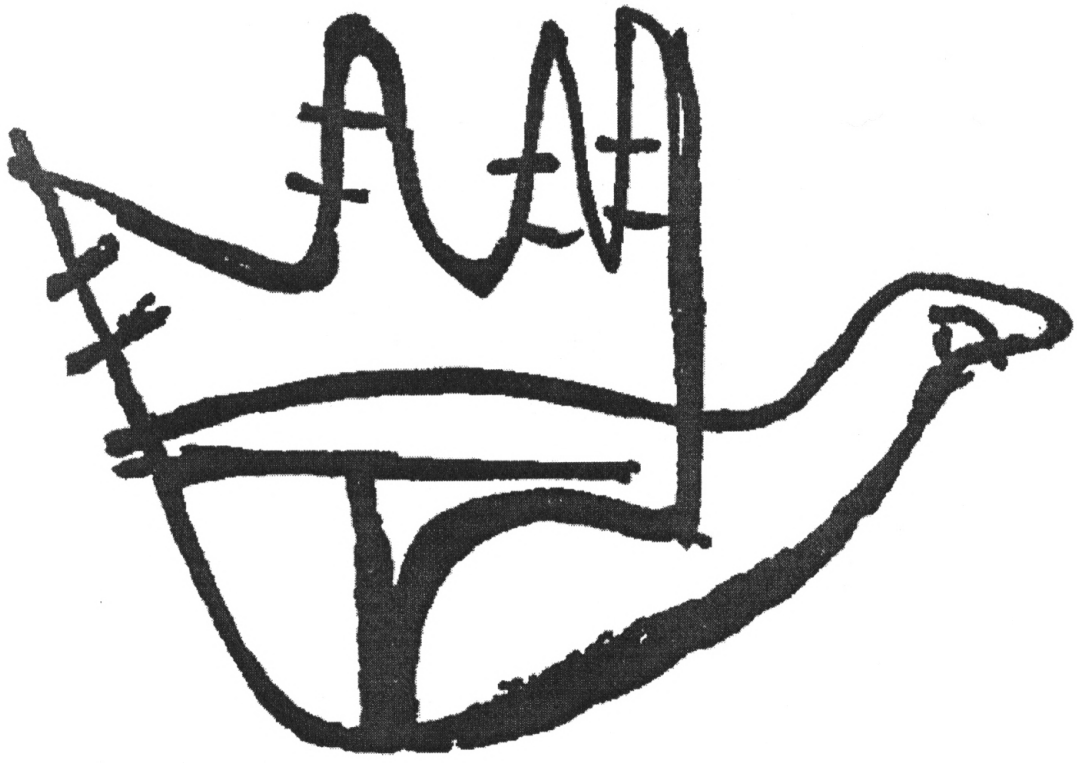
[55] Nowicki quoted in Evenson, *Chandigarh,* p.23
[56] Quoted by Nowicki in letter to Mayer dated August 16, 1950. *Evenson*, p.24.

team cannot be ignored and has to considered a part of the evolution of the city of Chandigarh.

SECTION 5

LE CORBUSIER'S MASTER PLAN OF CHANDIGARH



THE OPEN HAND: "OPEN TO
RECEIVE OPEN TO GIVE"
--Le Corbusier

CHAPTER 5.1

LE CORBUSIER'S MASTER PLAN

The sudden death of Matthew Nowicki and the reluctance of the Indian Government to pay Albert Mayer in American dollars prompted the administration to look for a new architectural team elsewhere. This time P.N. Thapar and P.L. Verma set off for Europe to recruit an architectural team that would be willing to spend a period of thee years in Punjab to oversee the completion of the project.

Rome was the first place Thapar and Verma visited in their search for a new team. They were faced with disappointment there as nobody was willing to leave all their projects behind and spend three years solely in India. The next stop was France where they first visited Auguste Perret's office. There too the Indian team was met with the same response. Next they called on Le Corbusier but he also seemed hesitant to undertake this venture. Disappointed, the Indian team went to England where they were introduced to Edwin Maxwell Fry and his wife Jane Beverly Drew. Finally, in these two architects, they found a team that was enthusiastic about the project and willing to devote ime in India on the meagre salary they were offered. One of the reasons Fry and Drew ıter cite for accepting the project was the enthusiasm generated by the Indian team of hapar and Verma who visited them. According to Maxwell Fry:

> *Yet nothing in the demeanor of those who visited us in the winter of 1951, nor in the members of the government I met in the following spring, betrayed nother than an anxiety to create the best possible city in the shortest time, and an unquenchable determination to turn disaster to good account, not only for the Punjabi's, but if possible for the world at large... What attracted us in these men who visited us and made us throw aside what we were doing to go to India and work for them on the site was*

the mixture of idealism with what I hold to be the divine principle of energy with which they put up their case.[57]

At the time Drew and Fry accepted the project, they were working on two projects. One was a project in Nigeria and the other was a design for the Festival of Britain. In order to finish these prior commitments, Jane Drew decided to stay back for some time. This necessitated the selection of another architect who could join Maxwell Fry immediately. It was at this point that Jane Drew suggested the addition of Le Corbusier, a fellow colleague and active member of C.I.A.M. (Congrès Internationaux d'Architecture Moderne) Accompanied by Drew, Thapar and Verma went to meet Le Corbusier again. Having had time to review his options since the last visit by the Indian team, he opted in favor of taking up the project.

To Le Corbusier, Chandigarh provided the opportunity to realize the urban design ideas he had been presenting on paper for almost thirty years. It started in 1922, when he presented an urban design scheme for " A Contemporary City for Three Million People". Several schemes were proposed after that, further developing his ideas about the city. Le Corbusier had to face constant disappointments in terms of unrealized urban design schemes. These includes proposal for the re-planning of Saint-Diè, a French city that was destroyed in World War II; the re-planning of La Rochelle-Pallice; a plan for Bogota with Jose Luis Sert and Paul L.Wiener that was delayed for political reasons and the Plan Voisin for the restructuring of Paris that was again only a theoretical project.[58] Chandigarh presented Le Corbusier with the opportunity to finally transfer his ideas from paper to reality.

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[57] Fry, Maxwell E. (1955). *Chandigarh: The Capital of the Punjab*. Journal of the Royal Institute of British Architects, January 1955, Vol.63. Pp. 87-95. P.87.

Thus, after his initial hesitancy, Le Corbusier agreed to undertake the project, but on the condition that his cousin, Pierre Jeanneret, be added to the team. The final Chandigarh team was decided and an agreement[59] signed. Le Corbusier was given the title of the Architectural Advisor and was to make two trips to India every year, each of one-month duration. His task was mainly to complete the master plan and to design the Capitol Complex. Maxwell Fry, Jane Drew and Pierre Jeanneret were designated as Senior Architects and were to reside in India for a period of three years. Their job was to oversee the completion of the project, undertake the design of other major buildings in the city and also develop different categories of government housing. They were to be assisted on the project by a team of Indian architects, planners and engineers. It is interesting that Jane Drew, Maxwell Fry and Le Corbusier, all were active participants in C.I.A.M. and shared similar ideas on city planning. C.I.A.M. was an organization of architects and planners whose main concern was to redefine the modern city and seek solutions to improve the state of existing ones. Such a background of the architectural team became crucial in the design of Chandigarh.

THE ARCHITECTURAL TEAM

Jane Drew and Maxwell Fry

Maxwell Fry and Jane Drew were a husband-wife team practicing in England. They were deeply involved in the activities of the M.A.R.S. (Modern Architecture Re-Search) as well as C.I.A.M. As members of these groups, they were interested in understanding and formulating program for a "minimum dwelling". Both had been

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[58] Evenson, *Chandigarh,* p. 103.

motivated by the de-humanizing affect of the industrial revolution on cities and the deplorable living conditions in the industrial slums of the city, to seek ways to improve existing conditions.[60] For both of them, design of the dwelling unit was of prime importance. In one of his books, '*Fine Building*', Maxwell Fry expressed his concern with shelter, housing, and the problems of the industrial city and its reconstruction. For him, shelter was associated not just with providing a roof to live under but with renewing the spiritual strength of its occupants.

> *Here then is the first principle of Housing, of whatever type or degree. Its purpose is to save and store up our bodily and spiritual strength: it is one of man's best inventions for self-preservation. An Englishman's home is his castle because it protects his life.*[61]

It is interesting to note that in his book '*Fine Building*', Maxwell Fry voices his dislike of the 'bye-law' street, which was one of the remedial solutions adopted in the English towns to improve sanitation and hygiene conditions. These streets were strictly controlled by zoning and building bye-laws, much like the ones that were eventually incorporated in the master plan of Chandigarh as frame controls. The bye-law street had strict rules defining the street widths, the distances between the backs of parallel rows of houses, the angles of light penetration, the width of service passages and so forth. For him such architecture was devoid of beauty and was "soul destroying".[62] Fry was against zoning too and believed that it was not a very effective urban design tool. According to him it was a "makeshift idea" that only served the purpose of specifying certain aspects

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[59] Refer to Ravi Kalia's book, '*Chandigarh: In Search of an Identity*', for a detailed account of the agreement and the salaries of the architectural team.

[60] Maxwell Fry was born and educated in Liverpool, England where he spent most of his formative years. His writings shows a concern for the living conditions in this industrial port city. For a detailed account, refer to: Fry, Maxwell. (1975). *Autobiographical Sketches*. London: Eleck Books Limited.

[61] Fry, Maxwell. (1944). *Fine Building*. London: Faber and Faber Limited. P.13.

of an urban space, such as the height of the buildings, the setbacks and the density of population. It did not deal with the quality of planning, which was of primary concern. All it did was bring uniformity to the zone.[63] Zoning and byelaws play an important role in Chandigarh and apparently Maxwell Fry's dislike of these very ideas was reversed at a later date, perhaps overshadowed by Le Corbusier's inclination towards them.

In the design of individual buildings, Maxwell Fy and Jane Drew were at an advantage, having had prior experience working in tropical regions. They had undertaken research on the efficient use of climatic elements and indigenous materials in the design of housing in the tropics. In their book "Tropical Architecture in the Dry and Humid Zones", they list three main considerations that influence design in the tropics:

- People and their Needs
- Climate and its Attendant Ills
- Materials and the Means of Building.[64]

They had completed several projects in the tropical belt of Africa, mostly in Ghana and Nigeria. Their designs were developed out of a response to the three elements mentioned above and out of a careful study of indigenous architecture. Thus, Fry and Drew had experience in designing for a climate close to that of Chandigarh. Elements from their designs in Africa can be seen in their architecture in Chandigarh. Some of the common elements are—roof overhangs, shaded balconies, ventilating walls (called *jaalis* in India), sun-breakers and louvres (Fig. 5.1).

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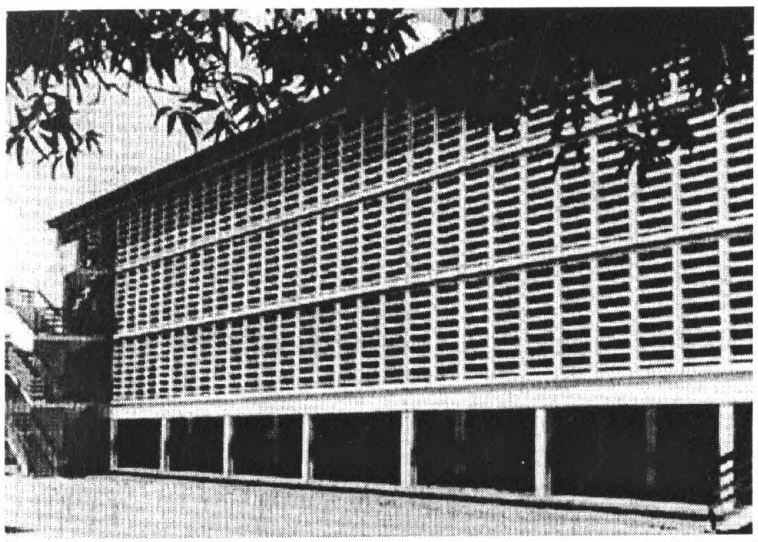
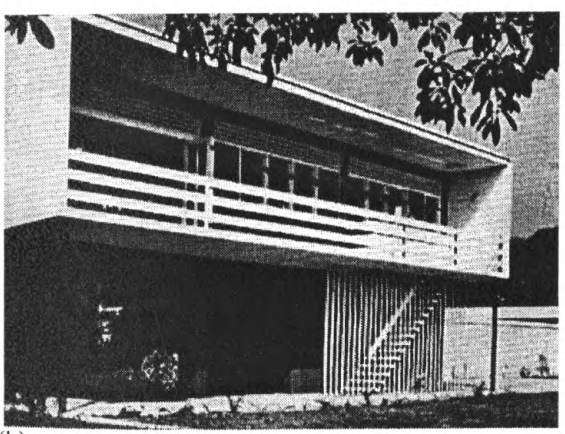
[62] *Ibid.*, p.34.
[63] *Ibid.*, pp. 52-53.
[64] Fry, Maxwell & Drew, Jane. (1964). *Tropical Architecture in the Dry and Humid Zones.* New York: Reinhold Publishing Corporation. P.21.

Though they did not have prior building experience in India like Albert Mayer or the passion of the young and prolific[65] Nowicki, they certainly were an equally qualified team with a deep sympathy and awareness of the needs of the region.



(a)



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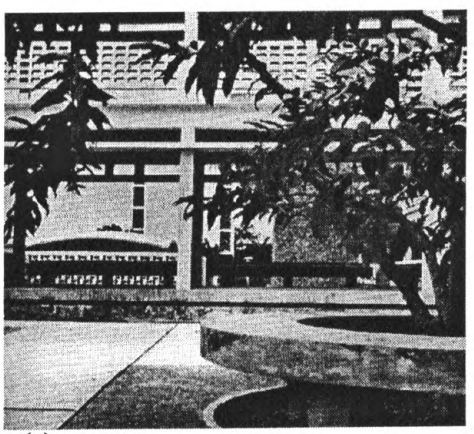

(c)

Fig. 5.1(a), (b), (c) Use of elements like louvres, shaded balconies and ventilating walls by Maxwell Fry and Jane Drew in their designs in West Africa.

[65] A view projected in the writings of Lewis Mumford.

Pierre Jeanneret

Pierre Jeanneret is famous as Le Corbusier's cousin and partner in practice. Unlike Le Corbusier, Jeanneret received a formal education in architecture. Jeanneret had also spent time working in Auguste Perret's office and, like Le Corbusier, learnt the use of reinforced concrete from Perret. Qualified to practice architecture, Jeanneret joined Le Corbusier in 1920 to supplement his growing practice in Paris. There he worked on several important projects including the League of Nations competition, the Salvation Army building and the Swiss Pavilion. Their partnership broke up for some but was revived at the time of Chandigarh. Unlike Le Corbusier, Jeanneret was willing to stay in India and manage the project. By the end of the stipulated three-year period Jeanneret became so involved in the project that he decided to stay on and was subsequently made the Chief Architect of Chandigarh. During his extended stay in India he designed a variety of projects including different types of housing schemes, schools, offices, shops, clinics and several major structures in the University complex.[66]

Le Corbusier

Le Corbusier (Fig. 5.3) was a Swiss architect practising in France. He has been called as one of the most influential architects and planners of the century and much of Chandigarh's glory can be attributed to his personality. Le Corbusier's urban ideas can be said to be as old as his architecture.

[66] Chowdhury, U.E. (1964). *Recent Works of Pierre Jeanneret.* In *Progressive Architecture*, February 1964, Vol. XLV, No.2. pp.148-155.

Fig.5.2 Pierre Jeanneret in Chandigarh.

Fig. 5.3 Le Corbusier (1887-1965).

Since the very beginning of his career, one can see the undercurrents of a sensitivity to the urban situation, though formally, his idea were presented to the public only in 1922 through the "Ville Contemporaine de 3 Millions d'Habitants". The quest for better and healthier living conditions for the populace was always a driving force in Le Corbusier's designs. The social role of an architect was not lost to him and he sincerely believed that architecture could play an important role in healing the malaise of existing cities. This attitude towards using architecture as a tool to improve social conditions was not new. It was the driving force behind the Garden City movement, the "Cite Industrielle" (Fig.5.4) by Tony Garnier (1917), the "La Citta Nuova" (Fig.5.5) by Sant'Elia (1913)[67].

[67] It is interesting to note an excerpt from "Messagio", an introduction to the Citta Nuova drawings, which posses an uncanny resemblance to Le Corbusier's ideas on urban design. "We must invent and rebuild *ex nuovo* our modern city like an immense and tumultuous shipyard, active, mobile and everywhere dynamic, and the modern building like a gigantic machine...The house of cement, iron and glass, without any curved or painted ornament, rich only in the inherent beauty of its lines and modelling, extraordinary in its mechanical simplicity...the street itself will no longer be like a doormat at the level of the thresholds, but plunge storeys deep into the earth, gathering up traffic of the metropolis, connected for necessary transfers to metal catwalks and high-speed conveyor belts."
Quoted from: Curtis, William J.R. (1996). *Modern Architecture Since 1900.* New Jersey: Prentice Hall. P.109.

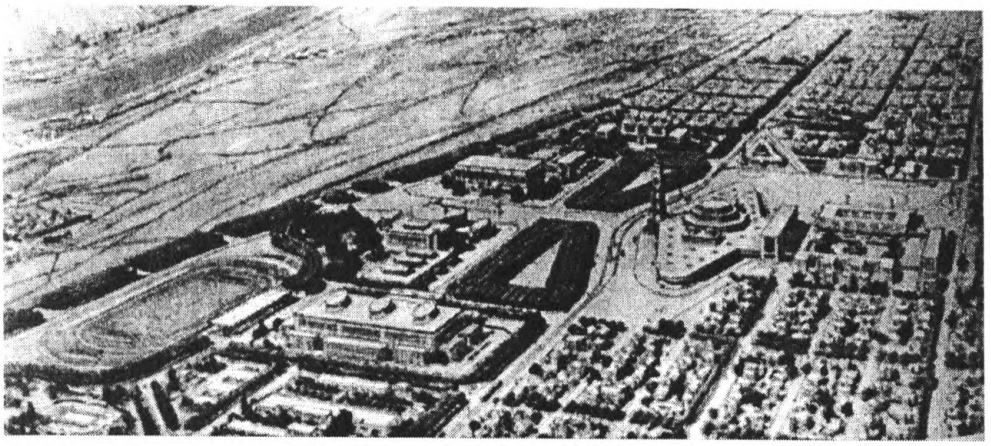

Fig.5.4 "Cite Industrielle" by Toni Garnier

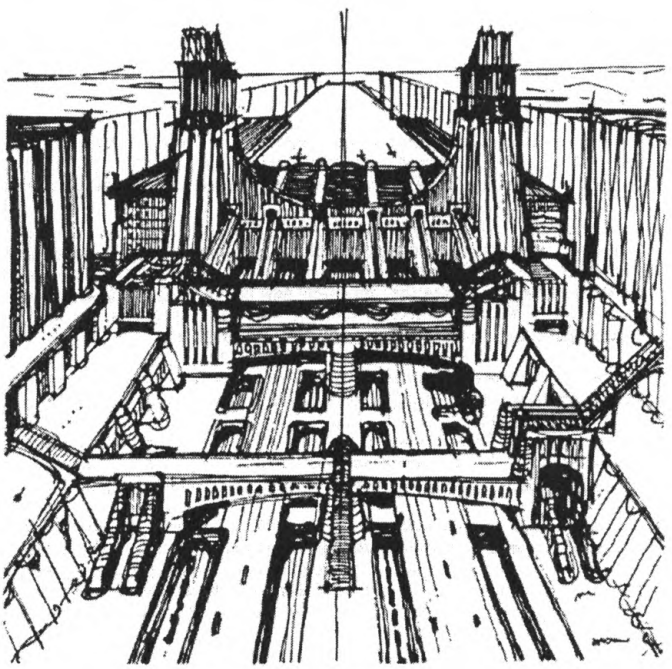

Fig. 5.5 "La Citta Nuova" by Sant'Elia.

Like these designers, Le Corbusier sought to define an architecture suitable for the new times, that would respond to present conditions and obliterate the problems faced by existing cities.

Conditions in existing cities had been worsened by the destruction caused by the two World Wars in the first half of the twentieth century. The industrial revolution had

already dramatically altered the way cities worked. Horse carriages had been replaced by motorized vehicles. The potential of building materials like steel, glass and concrete was being exploited, causing a revolution in the building industry. There was a mass influx of people to urban centers, to seek new opportunities resulting from industrialization. This migration led to urban congestion and a resultant strain on the urban infrastructure. The changed urban conditions, thus, were as necessitating a new urban structure.

In general it was the age of new ideas[68], diverse and revolutionary in nature. Architecture was faced with a multitude of problems. Disillusioned with the present state of affairs, many architects sought solutions in Utopian socialist ideas[69]. There was a host of new ideas spreading across the globe- Futurism, Constructivism, Expressionism, Cubism, Purism and Modernism. Though each of the above mentioned 'movements' had their own conception of 'the ideal city', the core idea was same. They all sought the re-planning of existing cities, the removal of urban slums and the provision of salubrious living conditions catering to the modern means of transportation and improving

[68] Socialism can be said to be one of the most prolific and influential social theories of the nineteenth century. It started with the ideas put forth by philosophers like G.W.F.Hegel (The Shorter Logic and the Science of Logic) and Henri Saint-Simon who is also called the precursor of socialism. It further developed with the ideas expressed by Karl Marx and Frederick Engels who formally introduced socialism to the world in general. The ideas of Saint-Simon are interestingly close to the ideas of Le Corbusier. Like in Le Corbusier's Contemporary City, Saint-Simon's city of the future has precise division of functions. The artists will appeal to the imagination of the worker and excite the appropriate passions. The men of learning "will establish the laws of health of the body social". The "industrials" (in which term Saint-Simon includes producers of all kinds and even traders) will legislate and issue administrative orders. Finally the executive- it is an unexpected climax-will be composed of bankers. (reference: http://mars.acnet.wnec.edu/~grempel/courses/wc2/lectures/saintsimon.html)

For information on Hegel, refer to web site: http://www.epistemelinks.com/Pers/HegePers.htm
For information on Saint-Simon refer to web site: http://mars.acnet.wnec.edu/~grempel/courses/wc2/lectures/saintsimon.html
For information on Marx and Engels refer to web site: http://www.marx.org/

[69] Curtis talks at length about some of them in Chapter 14 in his book '*Modern Architecture Since 1900*'. These include the works of Camillo Sitte, Ebenezer Howard, Toni Garnier and Hendrik Berlage.

productivity. Echoes of such ideas are also found in the ideas of CIAM,[70] whose aim can be summed up in a statement by Le Corbusier:

> *Established on four continents and embracing twenty-three countries, they have never ceased to nourish their debates with works having characteristic programs. The dignity of the dwelling, the modern form of habitation, the drawing up of a statute for the dwelling, the principles that bind together the city and the land, the very basis of the built domain, were the successive objects of their concerns. They have bent their energies to the improvement of premises that give shelter to the individual and collective life of man and that, according to the general policies directing their selection, have the power to engender unrest and social hatred, or well-being, trust, and joy.*[71]

Another statement, this one from 'The Declaration' at the First Congress at La Sarraz reaffirms this view. It states that similar minded architects had…

> *...joined together with the intention of seeking to harmonize the elements that confront them in the modern world and of setting architecture back on its true program, which is of an economic and sociological order, dedicated solely to the service of the human being.* [72]

Of primary importance was the Athens Charter, which was formulated as a result of the fourth CIAM conference held in 1933. The Athens Charter reflected the need for architecture to contribute to the development of society.[73] It redefined the core of the city, dividing the city into four functional zones: Dwelling, Work, Recreation and

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[70] CIAM was founded in 1928 in La Sarraz, Switzerland by a group of leading architects including Le Corbusier. The prime areas of focus were the city and the dwelling

[71] Le Corbusier. (1973). *The Athens Charter.* New York: Grossman Publishers. p.5.

[72] The fourth conference was interestingly held on sea aboard the Patris II, which sailed from Marseilles, France to Athens, Greece.

[73] Reaffirmation of the Aims of CIAM: CIAM 6, Bridgewater.
Quoted in: Ockman, Joan. (1993). *Architecture Culture: 19443-1968.* New York: Rizzoli International Publications, Inc. pp. 100-102.

Transportation. This idea was later rejected by some members of C.I.A.M.,[74] who then formed a new group called Team 10.

The aim of CIAM was basically to integrate the idea of contemporary architecture with technical, social and economic thought with a view towards human needs. As a means of doing that, CIAM advocated rigid functional zoning of city plans, a single type of urban housing (high, widely spaced apartment blocks), economic efficiency, rationalization and standardization.[75]

Apart from the influence of CIAM, the years spent in Paris working with Auguste Perret were fundamental in shaping Le Corbuiser's ideas about architecture as well urban planning. Perret had introduced Le Corbusier to reinforced concrete and French Rationalism. While Le Corbusier was working with him, Perret presented his ideas for a new city. Perret envisioned a city with towers rising above the boulevards, freeing space at the ground level for greenery.[76] The concept was similar to Le Corbusier's Contemporary City but unlike Le Corbusier's shiny glass and steel towers perret's were traditional in appearance (Fig.5.6) and instead of housing the industrial elite they were to be used for dwelling.

Le Corbusier was also influenced by the work of two French urban planners Baron Haussman and Eugène Hénard. Haussmann was involved in the urbanization of Paris in middle of the nineteenth century, at the time of the rule of Napoleon III and Eugène Hénard had proposed several transformations for Paris in the early part of this century.

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[74] The rejection of the idea of four functions was presented in the Doorn Manifesto in the ninth CIAM meeting held in January 1954.

[75] For a detailed analysis refer to: Frampton, Kenneth. (1996). *Modern Architecture: A Critical History.* New York: Thames and Hudson, Inc. pp. 269-279.

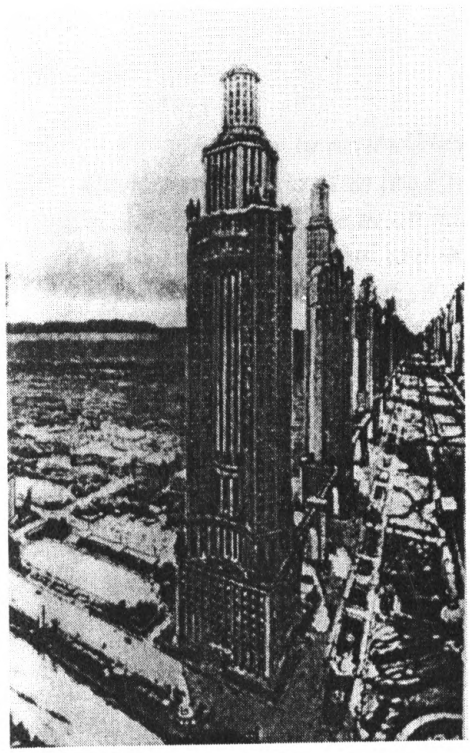


Fig. 5.6 City with tower blocks by Perret.

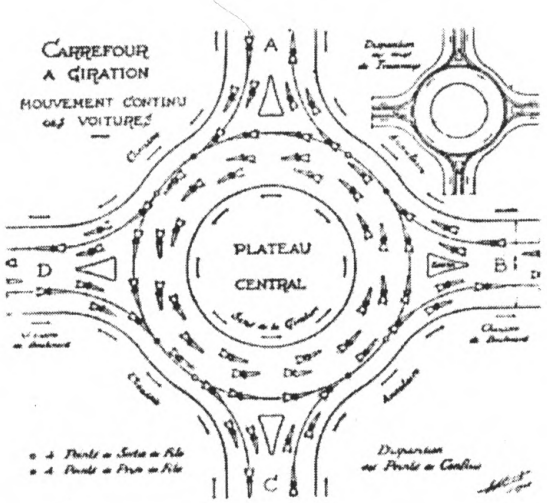


Fig.5.7 Traffic roundabouts in Paris by Hénard.

Hénard's proposal for traffic roundabouts for Paris (Fig.5.7) find a mention in Le Corbusier's book '*Urbanisme*'. Like Le Corbusier, Hénard proposed the segregation of vehicular and pedestrian traffic in Paris by creating different layers.[77] But unlike Le Corbusier's seven layers of traffic network, his were only two.

Though Le Corbusier always shunned and criticized the Beaux-Arts education prevalent at that time, some of his ideas were very similar to his Beaux-Arts contemporaries. The role of 'axes' in Le Corbusier's designs was very much in Beaux Arts style. For Le Corbusier the 'axes' of the city were important in imparting character

[76] Passanti, Francesco. *The Skyscapers of the Ville Contemporaine.* Assemblage. No.4, October 1987. Cambridge, MA: MIT Press. P. 56.
[77] Moos, Stanislaus von. (1980). *Le Corbusier. Elements of a Synthesis.* Cambridge, MA: The MIT Press. Pp. 187-238.

to the city and he monumentalized them in his urban designs. According to Stanislaus Von Moos:

> *In order to articulate the system of axes in the Ville Contemporaine and in the Plan Voisin, the architect reverts to the most classical means. The main axis of the Ville is a superhighway laid out between two triumphal arches. A closer look at the obelisks, columns, and monumental domes along the main traffic arteries as well as the layout reveals a composition worthy of any Beaux-Arts student.*[78]

The use of axes in the city is prominent in the plan of Chandigarh too, where the axes were formed by *Jan Marg* and *Madhya Marg*, the two main traffic boulevards (V-2 roads). The *Madhya Marg* or the Middle Avenue joined the Capitol Complex situated at the head of the city with the central district. The *Jan Marg* or the People's Avenue was the cultural and commercial axis of the city (Fig.5.8).

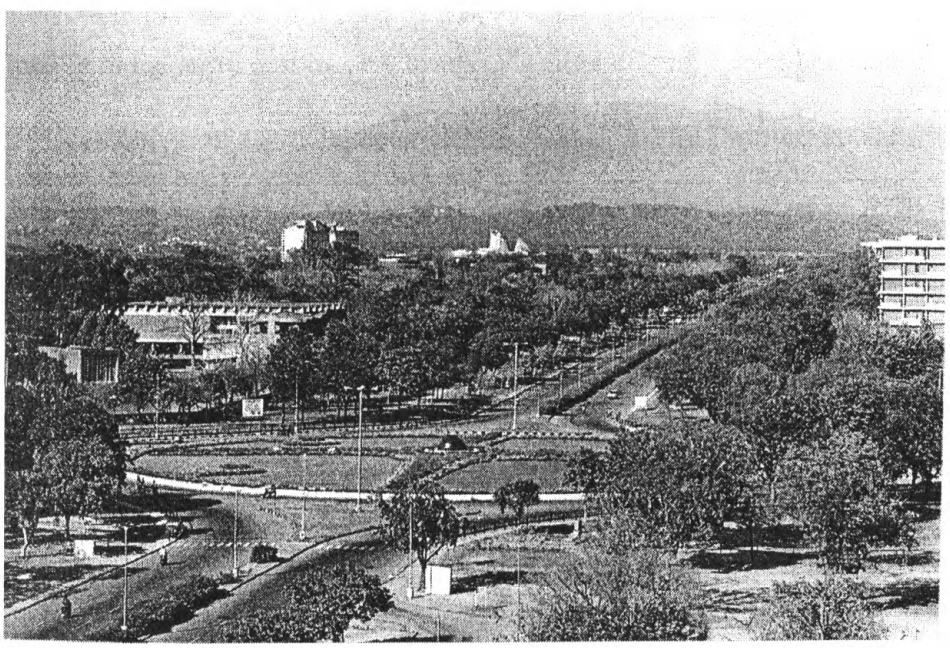


Fig. 5.8 A view of the Jan Marg, the cultural and commercial axis of the city.

[78] *Moos*, p.195.

It is also very important to trace Le Corbusier's urban ideas to his hometown of Le Chaux de Fonds where he spent the formative years of his life. After a disastrous fire in the year 1794, his hometown was redesigned on a strict gridiron pattern. This pattern had a strong impression on him. Close contact with nature in the Swiss Jura and his teacher L'Epplatenier's ideas were also influential in his early years. From L'Epplatenier he imbibed the deep respect and affinity for nature that is an important part of his urban design ideas.

Through his urban design ideas Corbusier was trying to define an ideal and universally applicable idea for city design. According to Kenneth Frampton, Le Corbusier's "utopian socialist aspirations" for an ideal city were inherited from L'Eplattenier and Garnier[79]. Le Corbusier was always an admirer of Garnier's Cite Industrielle and was formally introduced to him in 1908 by Perret.

Starting in the early part of Le Corbusier's architectural career one can see these urban ideas developing on a smaller scale in his designs for the Domino housing scheme (Fig.5.9) in 1914-15, the Maison Monol (Fig.5.10) and Maison Citrohan in 1920. He used these units as prototypes for urban layouts. One can presume they were to form typical housing blocks in cities. They are a testimony to his concern for better living conditions from an early stage. These designs form the stepping stones for his designs for the *immeuble villas* and the *à redent* blocks of the *Ville Contemporaine,* presented for the first time in 1922, and later reflected in the design of Chandigarh.

[79] Frampton, Kenneth. (1979). *Le Corbusier and L'Esprit Nouveau.* In *Oppositions*, Winter/Spring 1979, No.15/16. Cambridge, MA: MIT Press. Pp. 14-15.

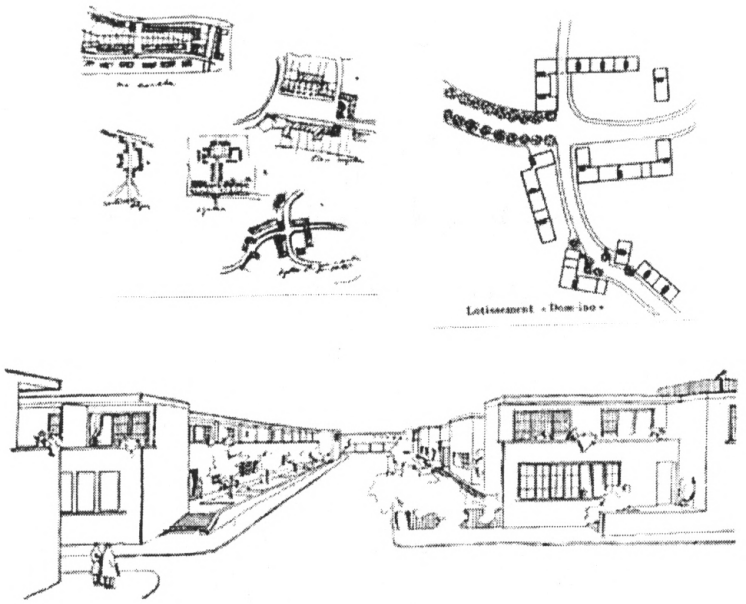


Fig.5.9 The Domino Housing Scheme (1914-15)

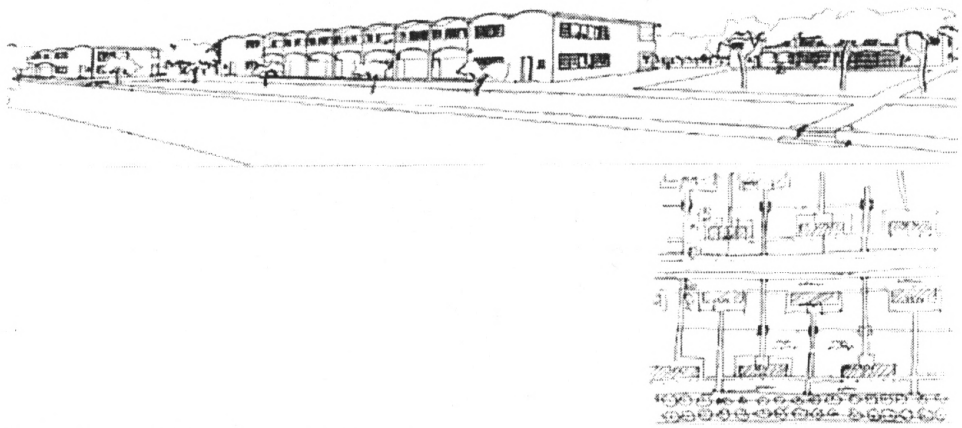


Fig. 5.10 The Maison Monol Scheme.

A Contemporary City for Three Million

The proposal for A Contemporary City for Three Million (Fig.5.10) was first exhibited at the Salon d'Automne in Paris in November 1922. Its ideal nature and detachment from existing reality was widely criticized. Defending himself on the project Le Corbusier commented:

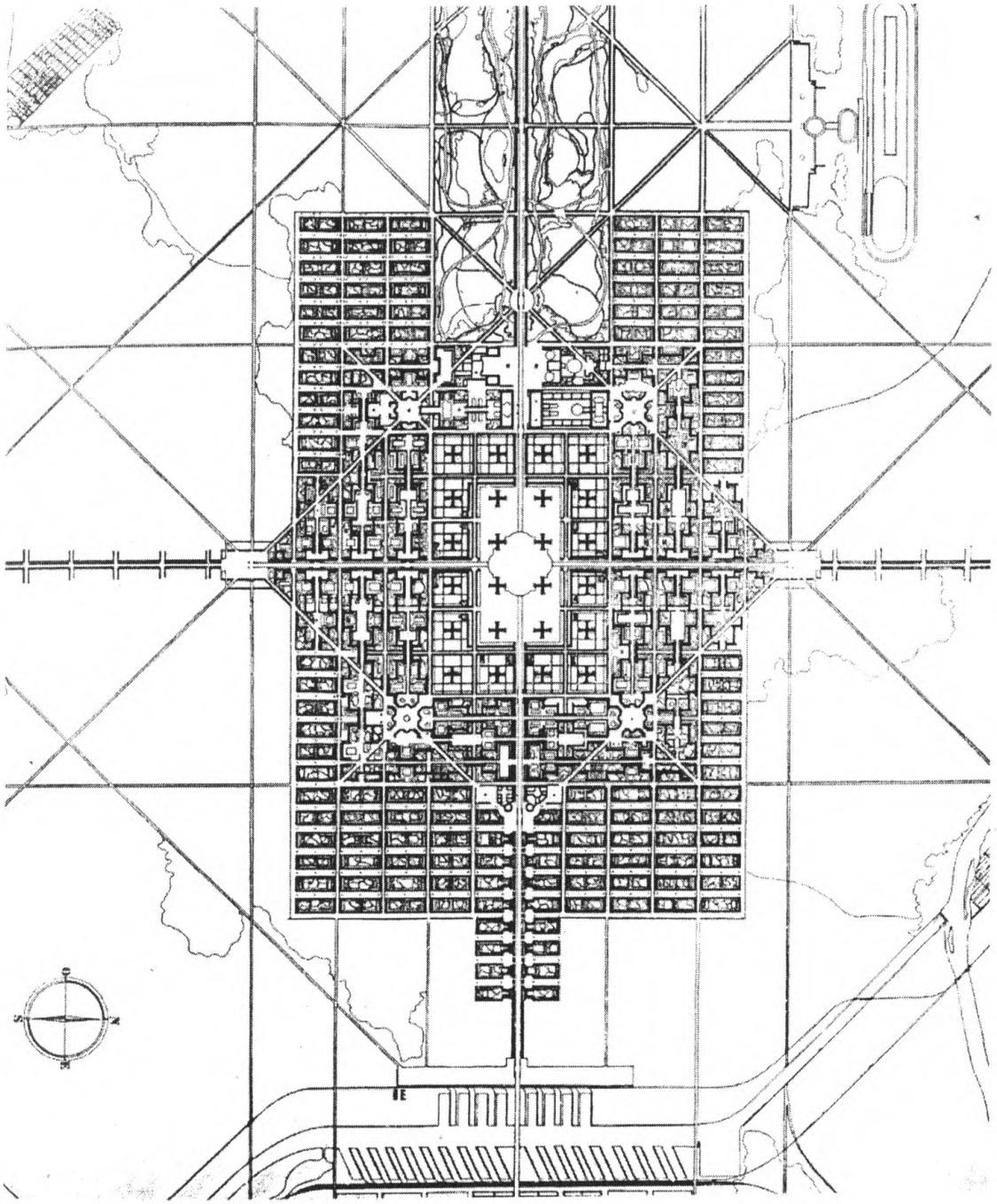


Fig. 5.11 Plan of the Contemporary City for Three Million (1922)

My object was not to overcome the existing state of things, but by constructing a theoretically water-tight formula to arrive at the fundamental principles of modern town-planning. Such fundamental principles, if they are genuine can serve as the skeleton of any system of modern town planning; being as it were the rules according to which development will take place.[80]

The Contemporary City was divided into four parts:

- The City Center which was the business hub of the city.
- The Industrial City.
- The residential blocks which housed the urban elite the city.
- The outlying garden suburbs for the workers.

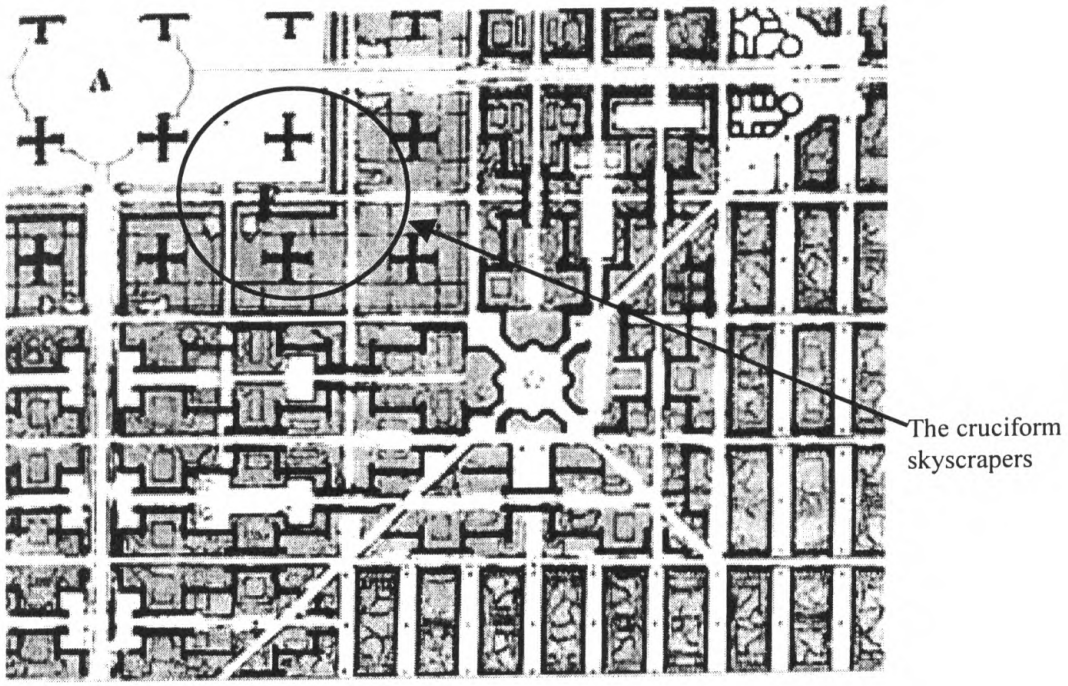
Features of the City

- **Density**

The density of the city was high enough to keep every important function within an easily commutable distance. This would reduce the distance to be traveled everyday leaving time for other activities, particularly leisure. This idea was later expressed under the title of a "twenty-four hour solar day".

The increase in density was achieved by building vertically. The center of the city was made up of twenty-four cruciform skyscrapers (Fig.5.12) that housed the businesses of the city. They were capable of accommodating 10,000 to 50,000 employees. The skyscrapers were placed in a park like setting. These green areas were the "lungs" of the city, providing breathing spaces that were necessary for a healthy life. This center also had some residential blocks, which could house around 600,000 inhabitants.

[80] *Moos.* p.164.



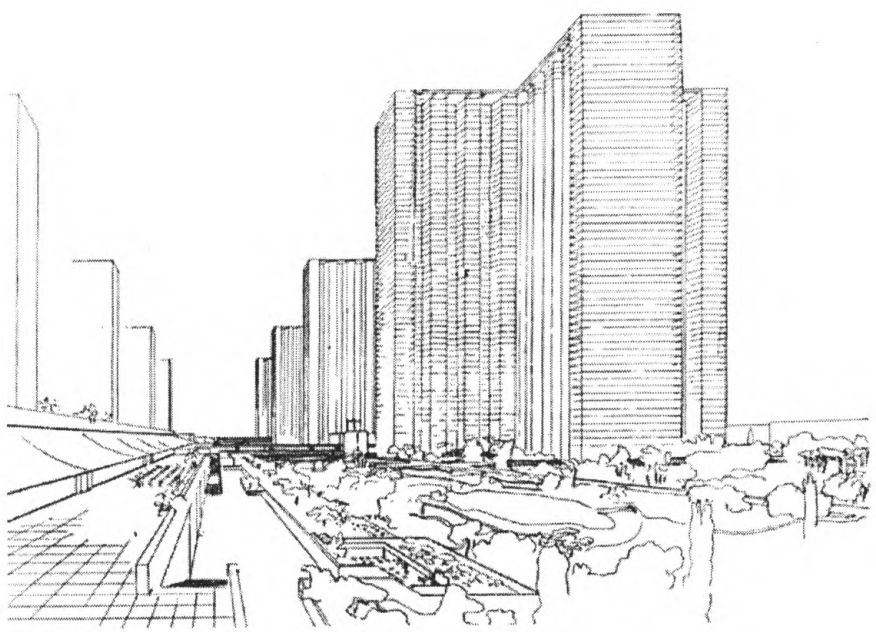


Fig. 5.12 The Cruciform Skyscrapers of the Contemporary City.

- **The Transportation Network**

The traffic problem was solved by separating traffic moving at different speeds into different levels. The number of crossings was reduced by increasing the distance between successive cross-roads. They were spaced at 400 yards, a measure that also formed the gridiron system of the city. The heavy goods traffic was taken underground. The fast one-way traffic roads formed the main axes of the city and were built on reinforced concrete viaducts.

The Central Station (Fig.5.13) was at the center of the city situated at the crossing of the main axes or arteries of the city, giving it an important position in the city. There was an underground subway system that would lead people directly from the suburbs to the basements of the skyscrapers. On the roof of the Central Station was an aerodrome giving center-stage attention to both of the modern means of transportation- the train and the airplane.

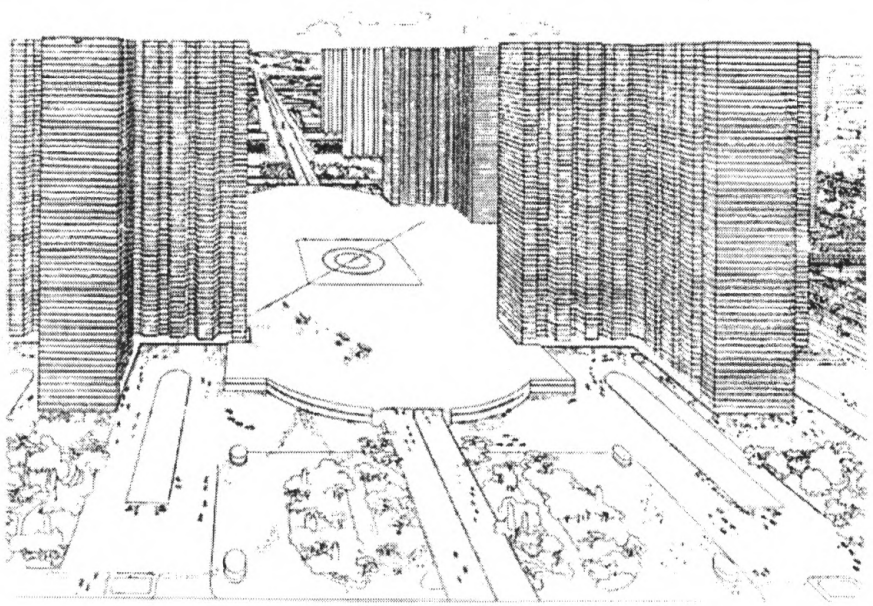


Fig. 5.13 The Central Station was at the center of the city.

- **Recreation**

The City Center (the heart) was also the center of recreation of the city. It had the museums, public buildings, the cafes, restaurants, hotels, luxury shops and parks. The city was surrounded by a "protected zone" of woods, green fields and sports grounds. No construction was permitted in this zone. Beyond this zone were the garden cities.

- **Residential Areas**

The residential district was made of two kinds of blocks: the first were blocks of dwellings (Fig.5.14 & 5.15) on the "cellular" system (*immeubles villas*) and the second were blocks of dwellings with "set-backs" or *à redents*. These units were standardized houses that could be mass-produced and would even have standardized furniture. The houses were so arranged that every house had a view of the green open spaces outside.

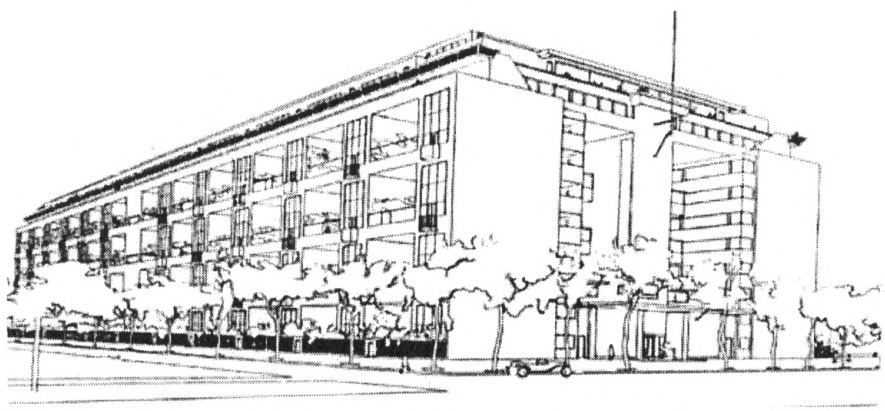


Fig. 5.14 The *Immuebles Villas*.

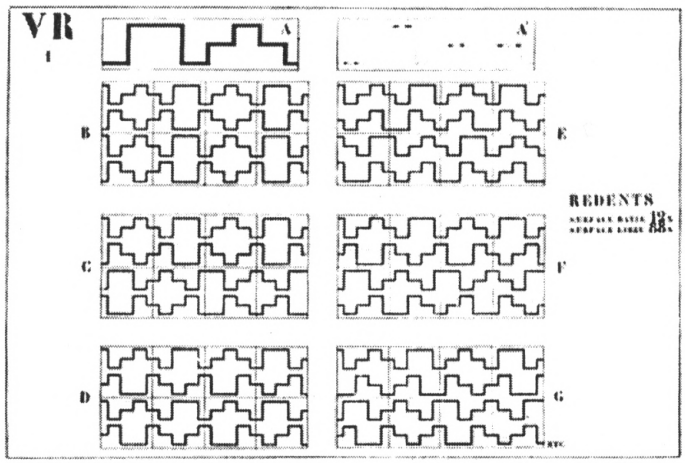


Fig. 5.15 The à *redents*, dwellings with set-backs.

- **Human scale**

Nature was the main element used to humanize the urban scale, mainly in form of trees. This scaling down was supplemented by the introduction of an intermediate level between the skyscrapers and the streets. The soaring skyscrapers were bordered by buildings not more than three stories high housing shops and other recreation facilities. The streets were thus on a human scale.

In general, the Contemporary City was based on the notion of centralized technocratic power. The business elite was at the center in his city.

Le Corbusier's urban ideas went a step further with the presentation of 'Plan Voisin' in the Pavillon de l'Esprit Nouveau in 1925. By this time, Corbusier was actively involved in seeking solutions to urban problems.

Plan Voisin

The Plan Voisin (Fig. 5.16) was a response to the decaying conditions of urban life in Paris, his place of abode for most of his architectural life. Increasing urban growth, squalid living conditions, congestion, lack of verdure and traffic mismanagement were some of the problems Paris was facing. Urban planners like Baron Haussmann and Eugène Hénard had put forth some proposals for the restructuring of Paris. But Le Corbusier went a step further and instead of proposing ways to improve the existing, he proposed extensive demolition right in the center of Paris. A two square miles area in the heart of Paris was to be razed to ground, save only a few historical landmarks. This area was to be covered by eighteen skyscrapers that would house international corporations (Fig.5.17). Like in the Contemporary City, these business centers were placed amidst greenery and surrounded by housing blocks.

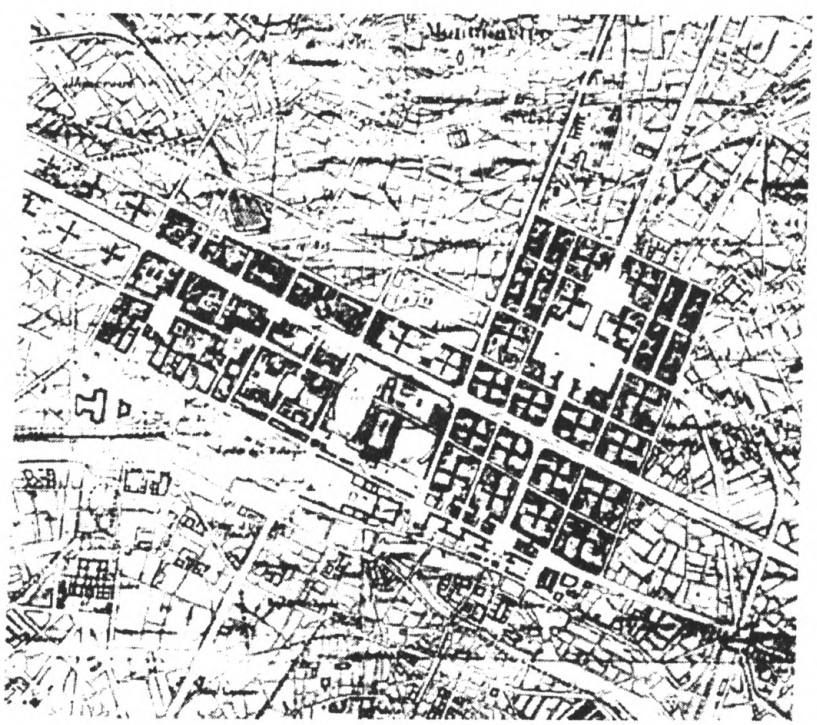


Fig. 5.16 Plan Voisin for Paris.

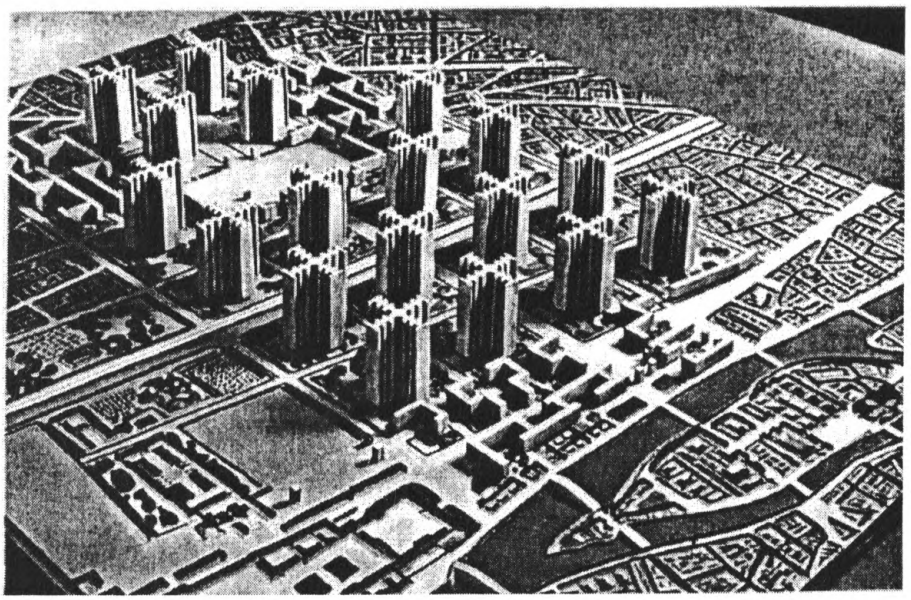


Fig. 5.17 Model of the proposed restructuring of Paris, Plan Voisin.

As in the Contemporary City, Le Corbusier's proposal was to remove the narrow corridor-street in the central district. According to Le Corbusier, narrow streets and low density of the city center were no longer applicable in the new age. The streets were to respond to the new means of transportation, the cities were to be designed for speed and the time of travel had to be reduced. The main axis of the city was again the artery for fast traffic and ran east to west. The main artery was 400 feet wide with one-way traffic and without any cross-roads. The plan was on a gridiron system with cross-roads every 350 or 400 yards. Only 5 per cent of the land was built on and the remaining was devoted to parks, roadways and parking.

Basically the ideas were the same as for a Contemporary City, only applied to a real site. But such a destruction of the historic district of Paris and its replacement with modern steel and glass skyscrapers was not received with much enthusiasm.

The Radiant City

In the 1930's, eight years after the proposal for the Contemporary City, Le Corbusier presented his design for the Radiant City. The Radiant City represented a marked change in his urban ideas. The concentric planning of the Contemporary City was replaced by linear zones/strips in the Radiant City (Fig.5.18). With this evolution, Le Corbusier rebuked his earlier attempt at concentric planning.

> *Any concentrically designed city (all cities designed in the past on ground plans determined by "donkey tracks"; also my own project for a modern city of 3 million inhabitants) makes regular organic development impossible: a biological defect.*[81]

In the Radiant City the government and business district was at the head of the city instead of in the center as in the Contemporary City. The center was the residential district that could be expanded horizontally to either side. The middle of this central strip, the heart of the city, had public facilities and was also the cultural and institutional zone of the city. The bottom zone was the Industrial Area, separated from the rest of the city by a green belt forming a buffer zone. Heavy Industry was to the extreme south in the plan.

Many of the ideas from the Contemporary City still existed. The Radiant City also used increased density to reduce the spread of the city, thereby reducing the distance to be traveled to and from work, leaving more time for leisure.

Garden suburbs were eliminated and nature was brought into the city. The density of the residential area was 1000 persons per hectare and that of the business district was 3200 persons per hectare. Such a density was again achieved by building vertically.

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[81] Le Corbusier. (1967). *The Radiant City*. London: Faber and Faber Ltd. P. 168.

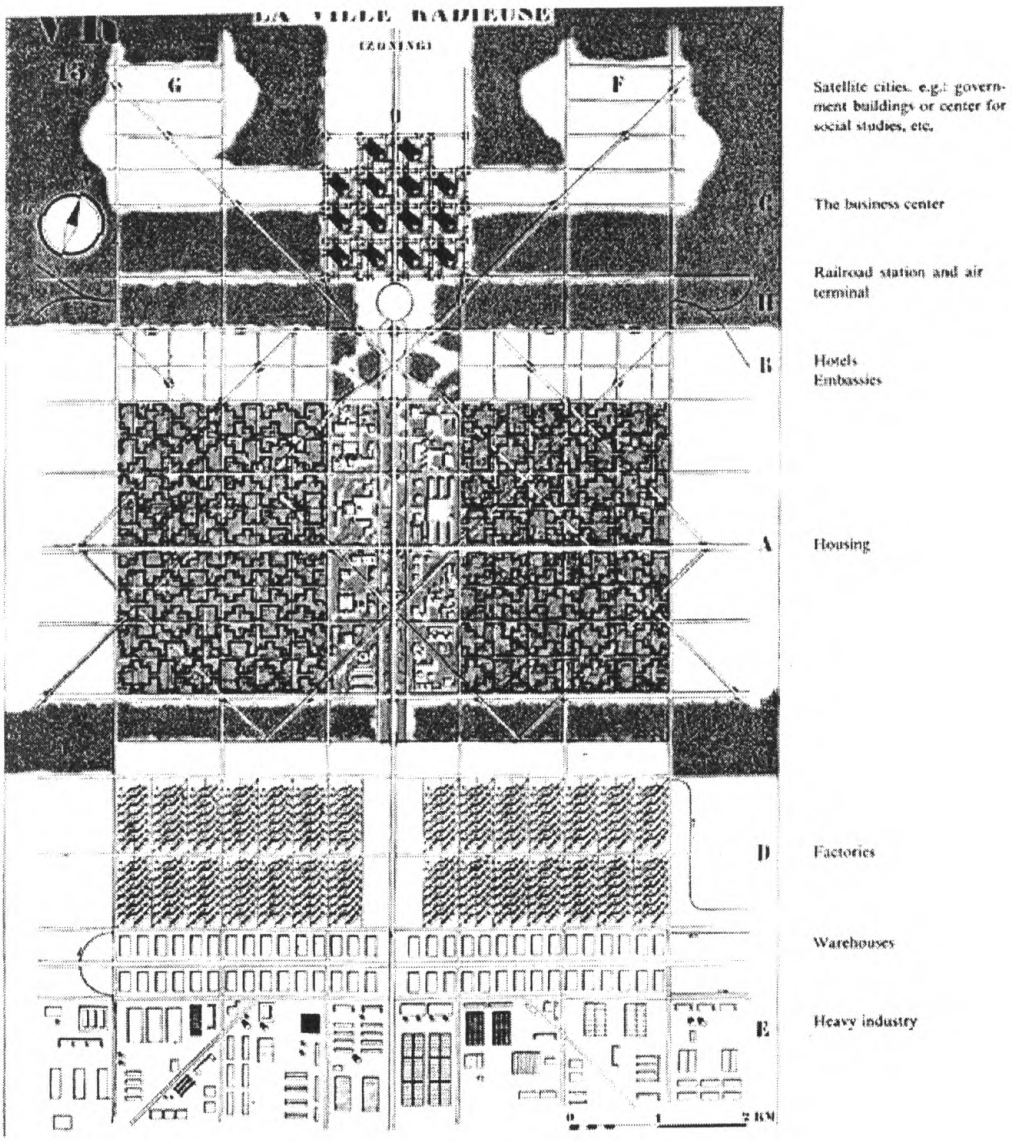

Fig. 5.18 Plan of the Radiant City.

Glass and steel skyscrapers, 220 meters high, were placed 400 meters apart. The ground surface made up of parks and was entirely for pedestrians. All fast moving traffic was segregated and cordoned off from the pedestrian areas. To facilitate unimpeded movement of fast moving vehicles all fast traffic roads were one-way. The highways and auto-ports were placed 5 meters above ground level. Several alternatives for managing

traffic were proposed (Fig.5.19). As always, an efficient transportation system formed the backbone of the Radiant City.

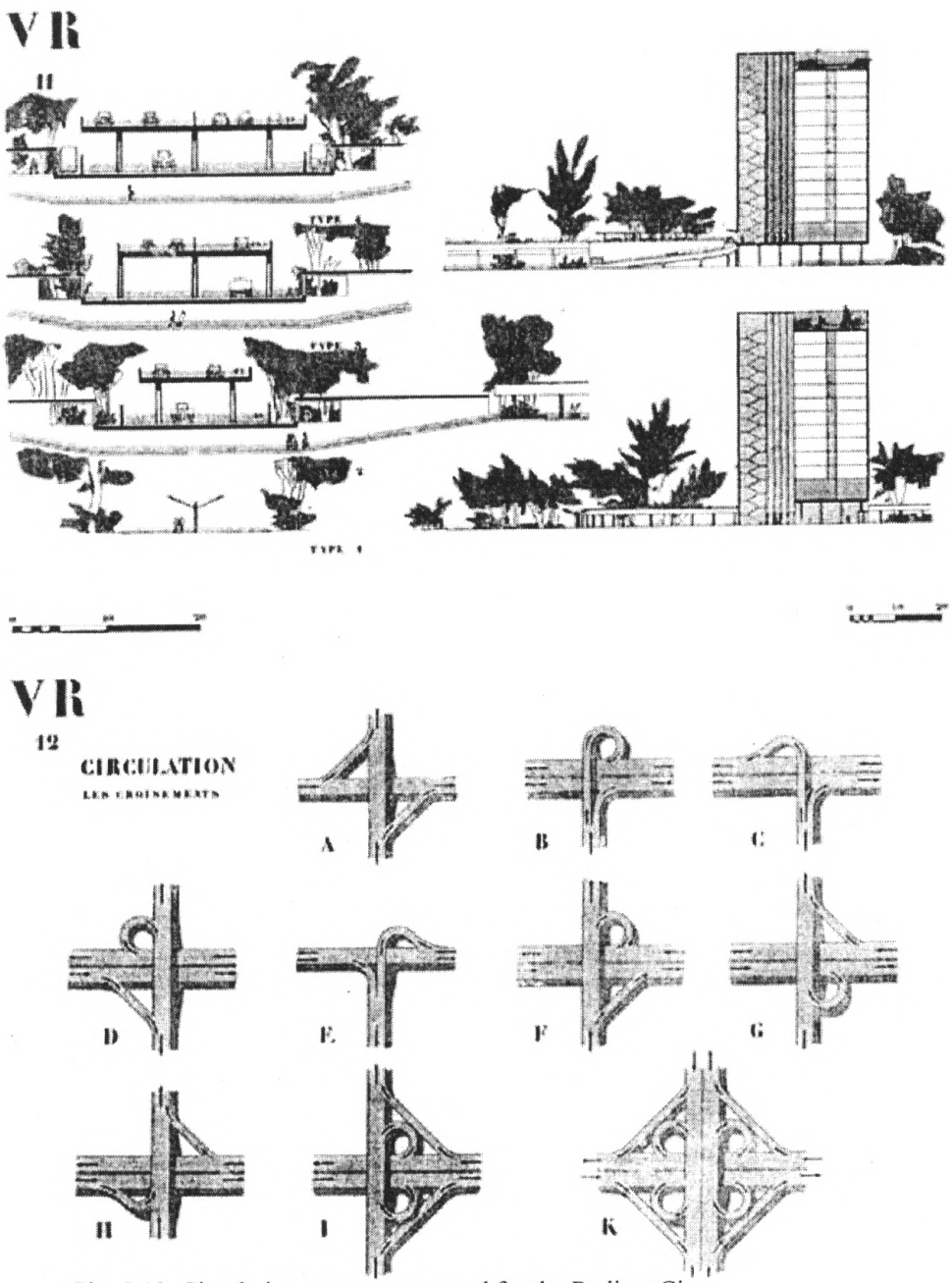

Fig. 5.19 Circulation systems proposed for the Radiant City.

Liberty of the individual was of prime importance and the whole city was designed to facilitate it. All the facilities required in daily life were provided within walking distance of the residences. One of the main aims of Le Corbusier was to reduce the working day to only 5-7 hours and leave the rest of the day for repose. According to Le Corbusier, one of the major drawbacks of the suburbs was the time wasted in commuting to and from work, leaving little time for family life. He proposed to reduce traveling distances by increasing the density of the business district and bringing it closer to the residential area.

The dwelling blocks in the Radiant City were mostly *à redents* raised on pilotis. Le Corbusier suggested several alternatives for the layout of these setback blocks. Like the Contemporary City the apartment blocks were placed in a park like setting with outside view for every unit.

By this time Le Corbusier had become deeply immersed in the idea of designing for a healthy life, one of whose requirements was the provision of a suitable environment for breathing. According to Le Corbusier, "Man who breathes well is an asset for society. "[82]

This concern with providing hygienic living conditions for the individual was reflected in the 1930 C.I.A.M. Congress in Brussels, which was devoted to the issue of *Air-Sound-Light* . Le Corbusier proposed:

> *For all men, in cities and in farms:*
> *Sun in the house,*
> *Sky through their windowpanes,*
> *Trees to look at as soon as they step outside.*[83]

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[82] *Ibid.* p.40.

Though physically the Radiant City was constituted of almost the same elements as the Contemporary City, its nature of power and control was very different. The business elite of the centralized Contemporary City was no longer the sole head of the city. There was an increased inclination towards the Syndicalist doctrine. According to Robert Fishman, there was a juxtaposition of the individual with collective life. He suggests that Le Corbusier believed that syndicalism would provide a "pyramid of natural hierarchies" for planning purposes. [84]

Thus, Le Corbusier's urban design proposals were not only a set of drawings for laying out new towns, but were also social tools meant to improve the existing ills of the society. His aim was to propose a new social structure for a society living in a new age.

From a review of these three urban design projects, elements constituting his urban design ideas have been listed:

- **The straight line/gridiron pattern**

Le Corbusier's affinity for the gridiron pattern can be traced back to the layout of his hometown La Chaux de Fonds and to the layout of the American cities that he observed closely.[85] He had a special affinity towards the straight line. For Le Corbusier right angle was the generator of order. According to him nature was also based on an 'order' which everybody had to follow. The use of "twisted streets and twisted roofs"[86]

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[83] *Ibid.* p.86.
[84] *Fishman.* p.24.
[85] Reference to American cities of Minneapolis and Washington is made in 'The City of Tomorrow' in the chapter "The Pack Donkey's Way and Man's Way".
Le Corbusier. (19?). *The City of Tomorrow and its Planning.* New York: Payson & Clarke Ltd. pp.5-12.

[86] *Ibid.* p.24.

was a sacrilege of that order. He substantiated his ideas by quoting examples of towns from the past such as Babylon (Fig. 5.20) and Peking (Fig. 5.21).

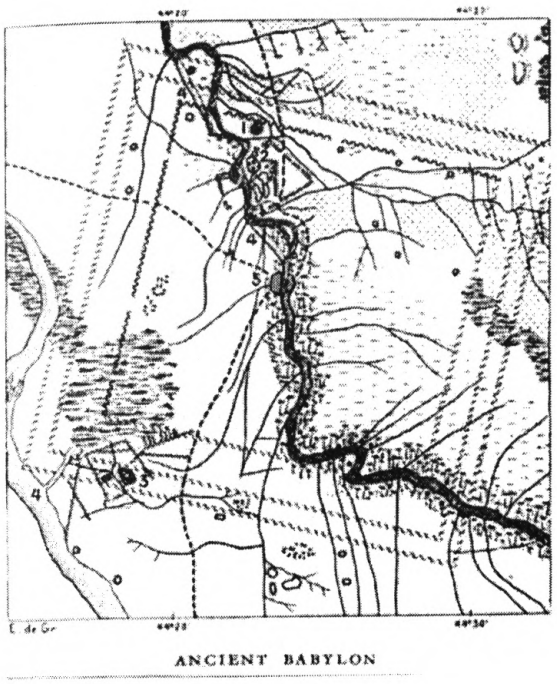

Fig. 5.20 The geometric plan of ancient Babylon.

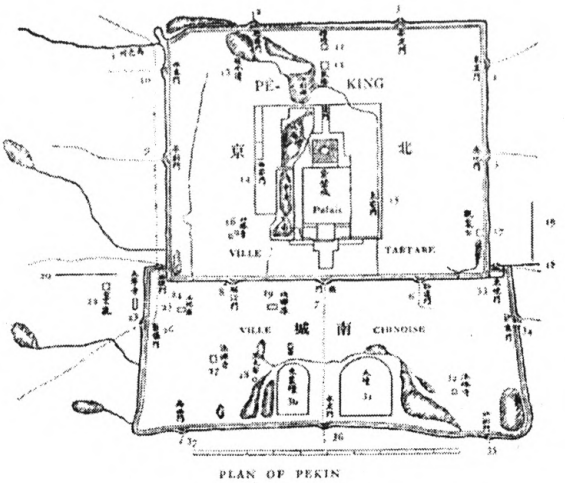

Fig. 5.21 The plan of ancient Peking.

- **City to respond to the times and to strive towards permanence**

For Le Corbusier it was important that any solution for city planning be a by-product of contemporary conditions and resources available. He favored the use of technology to achieve his ends. But technology had to be superseded by a sense of judgment or "individual sensibility" that could either give the design a transient value or make it immortal. To support this point he used the example of Roman acqueducts and the Eiffel Tower.

- **Unity in detail**

Le Corbusier was in favor of establishing a general standard for housing units, which he called the "cosmopolitan cells". According to him a universal standard was necessary to achieve mass-production, which would result in economy in construction and impart uniformity to the city resulting in general calm.

- **Removal of "corridor-street**

Le Corbusier's proposals relied on the removal of corridor-streets and introduction of efficient traffic movement in the general layout.

- **Verdure**

Verdure was one of the most important elements in the city. Landscape elements were not only to provide an intermediate scale between the street and the building but also to appease the soul and to make life more salubrious.

- **Decongestion of City Center**

The city center was one of the main elements in his cities. He suggested its decongestion in order to respond to the demands of increasing traffic.

- **Cities to be designed for speed**

New cities were to be designed for speed. New transportation network was to respond to the demands of increasing vehicular traffic and the need to segregate traffic moving at different speeds.

- **Salubrity and health of the individual**

Le Corbusier was occupied with providing healthy living conditions for every individual by providing every individual with the 'basic pleasures' which were sun, greenery and space.

All these elements persisted in the design of cities by Le Corbusier and are important in understanding the evolution of Chandigarh. Thus, a study of Chandigarh is undertaken with these elements in view.

LE CORBUSIER AND CHANDIGARH

The program of the new city demanded a city with high physical standards, adequate open space, not congested like the older cities of India, and a city that would be vital and safe, forming a model for future cities. The city was to be a symbol of pride for the new nation and convey an appropriate expression of national identity. The planning of the city, thus, provided a multi-faceted program to the architectural team.

THE MASTER PLAN OF CHANDIGARH

When the new team was hired, it was stipulated that the master plan by Albert Mayer would be retained. But Le Corbusier, with his strong and sometimes vociferous ideas, re-worked the original plan.[87] He replaced the generous curves of Mayer's plan with a rectilinear and more ordered grid (Fig. 5.22).

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[87] Maxwell Fry comments, "Albert Mayer's pilot plan was a very fine job; but he, along with us all in the early discussions over the final plan, yielded to Le Corbusier's deeply based arguments and to the relentless pressure of his personality, and what went forward had his agreement too."
Fry, Maxwell E. (1955). *Chandigarh—New capital City.* Architectural Record. June 1955.

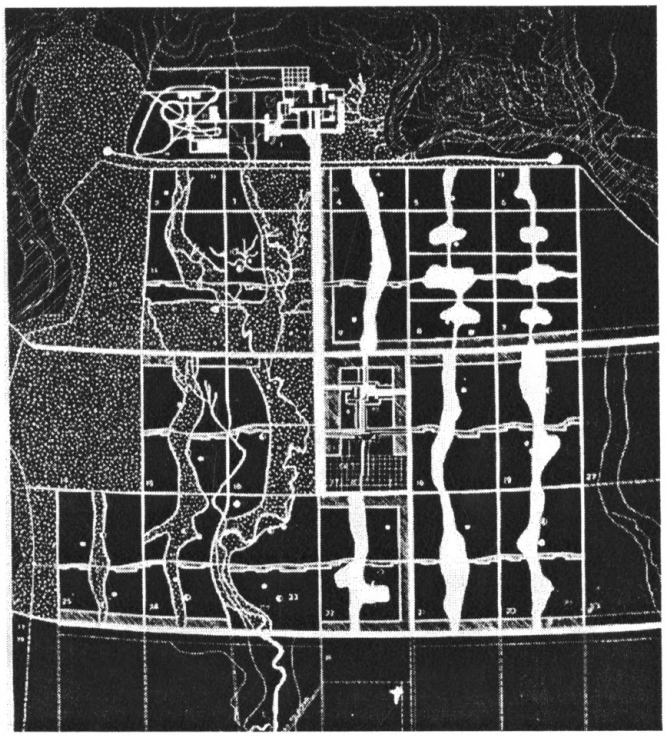

Fig.5.22 Le Corbusier's master plan for Chandigarh.

As discussed previously, Corbusier was a proponent of straight lines and right angles.

> *Man walks in a straight line because he has a goal and knows where he is going; he has made up his mind to reach some particular place and he goes straight to it. The pack –donkey meanders along, meditates a little in its scatter-brained and distracted fashion, he zigzags in order to avoid the larger stones, or to ease the climb, or to gain a little shade; he takes the line of least resistance.*[88]

The basis of the plan was the division of the city into four main functional zones: living, working, care of the body and spirit and circulation.

- **Circulation**

The most prominent feature of the plan is however the 'circulation' element constituting a road network defined by the Seven V's (*Le Sept Voies*), which consists of seven types of roads differentiated by their function and traffic speed.

- The V1 represents the regional highway leading into the city. The V1 roads are kept free from development to permit high-speed traffic to move unobstructed.
- The V2 forms the main horizontal axes of the city. In case of Chandigarh, they are the *Jan Marg* and *Madhya Marg*.
- The V3's are the roads surrounding the sectors. They form the grid pattern of the city and are for fast moving motor traffic. These roads have no sidewalks and no frontage development is permitted on them.
- The V4 is the road bisecting the sector. It forms the shopping street of the sector and traffic is relatively slow moving. All frontage development facing the V4 roads, is controlled by strict architectural controls to permit a uniform street façade.
- The V5 is the loop road that intersects the V4 at two points in each sector. It distributes slow traffic within the sector and has minimum frontage development.
- The V6 roads branch out from the V5 loop road, providing access to individual houses[89].
- The V7's are paths for pedestrians and cyclists and run through the park belt of the city.

The skeleton of the plan of Chandigarh is formed by a gridiron of V3 roads intersecting at half a mile across and three quarters of a mile vertically in the plan. This

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[88] Le Corbusier. (1987). *The city of to-morrow and its planning.* New York: Dover Publications, Inc.

gridiron forms a series of blocks called "sectors", each of which covers an area of around 240 acres. These V3 roads are 100 feet wide with a carriageway of 44 feet and are lined with trees on both sides. Thus, Mayer's proposal for three super-blocks forming a district housing around 3500 families each was replaced by Le Corbusier's sector (Fig. 5.22) measuring 800 x 1200 meters housing 5000 to 15,000 people.

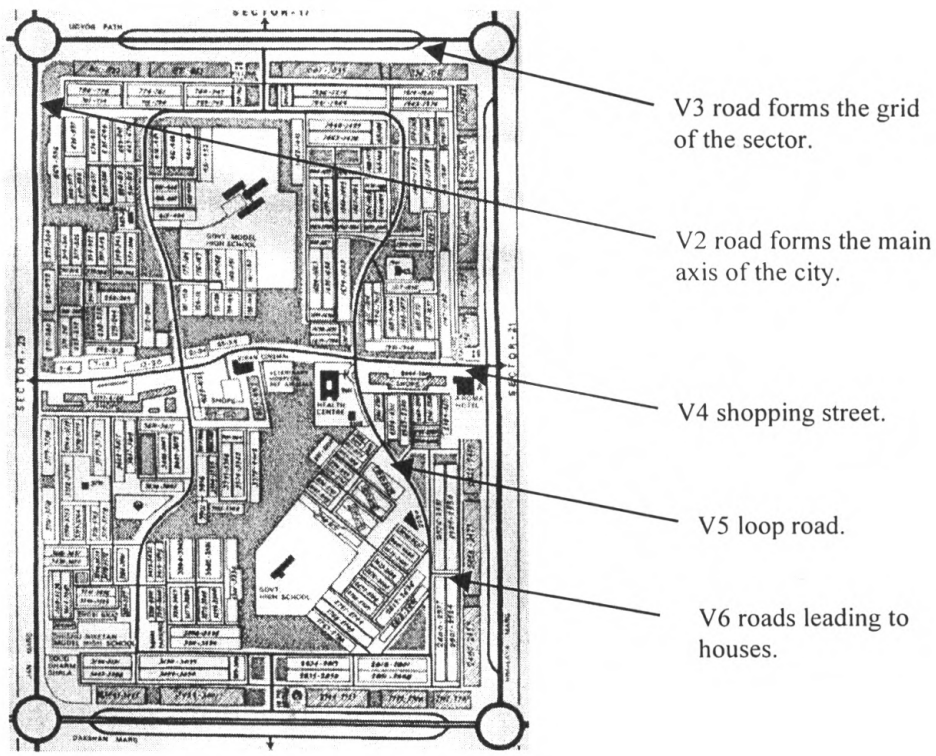


Fig. 5.23 A typical 'sector' in Chandigarh

- **Living**

A sector in Le Corbusier's plan is a neighborhood unit creating physical and social units of smaller and manageable size. Each sector is a self-contained unit providing the residents with all the facilities required as a part of daily life within walking distance. It is in the sectors that 'living' occurs. The sectors are planned internally with traffic

[89] *Evenson,* p.32.

entering only at four specified points from the V3 or V2 grid roads. The sector is bisected internally by the shopping street (*Bazaar* Street) which is a V4 road with slow moving traffic. The Shopping Street unlike the V3 road is irregular in pattern. Shops are provided only on the shady side of the street, eliminating the need to cross the street. The shopping areas are mainly rows of shops with covered pedestrian arcades and a piazza in the front for parking. The V4 road intersects the V5 loop road at two points. The loop road distributes traffic from the V3 to the sector and is only for slow moving traffic. From the V4 and V5, a network of V6 roads brings traffic to individual houses. Thus, there is a strong hierarchy in traffic distribution from the highways to individual houses based essentially on speed of traffic. Though in Chandigarh, Le Corbusier was not able to provide the elevated highways or subways of the Contemporary or Radiant City, it was still the traffic network that gives character to the city.

- **Working**

The most important contribution of Le Corbusier to the city is however the Capitol Complex, forming a part of the 'working' zone. The citadel of the new government is placed ceremonially at the 'head' of the city, taking advantage of the picturesque mountain backdrop. It consists of the Assembly Building (Fig. 5.24), the High Court (Fig. 5.25) and the Secretariat (Fig. 5.26), set in a concrete park designed for pedestrians. All three buildings in this complex are designed on the Modulor scale and are built in *beton-brut*. Various sun protection elements like sun shades, louvres, *brise-soleil* and arched canopies give character to the buildings. Reflective water pools set amidst verdant surroundings, and elements such as the Tower of Shadows (Fig. 5.27) and

the Open Hand monument (Fig. 5.28) give the capitol complex a distinct character. The varied design and grand scale of the buildings make it a truly monumental group of buildings.

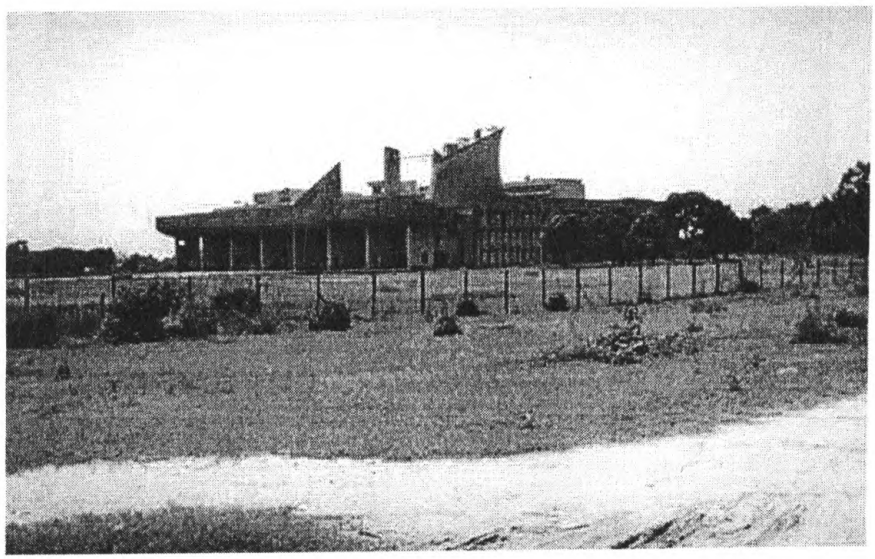


Fig. 5.24 The Assembly Building in the Capitol Complex.

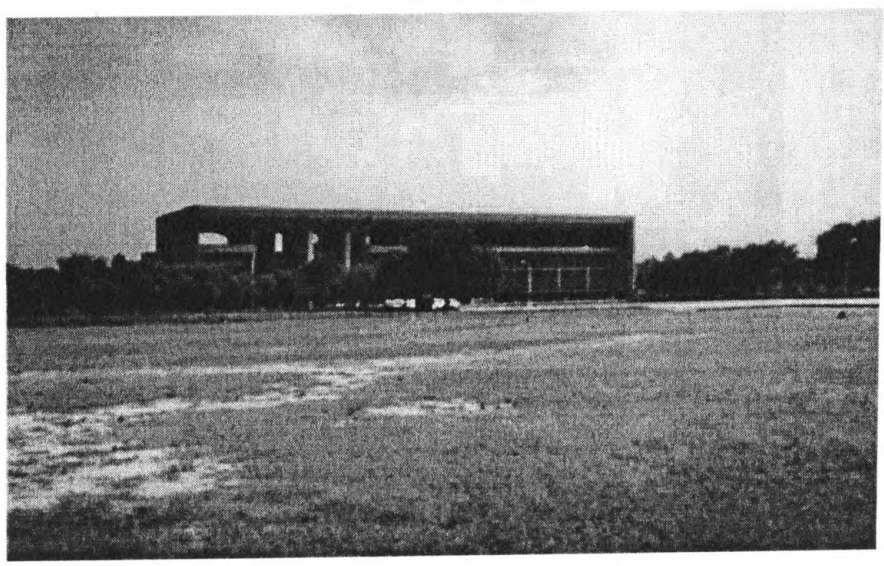


Fig. 5.25 The High Court with its parasol and *brise-soleil.*

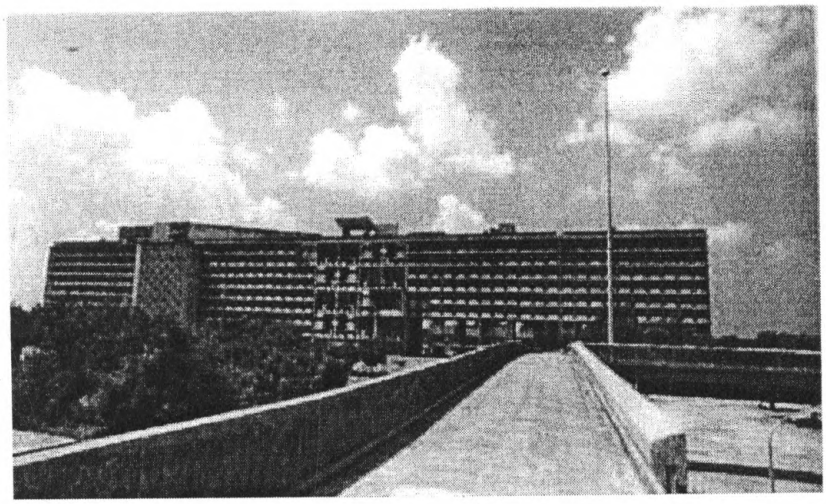


Fig.5.26 The Secretariat building by Le Corbusier.

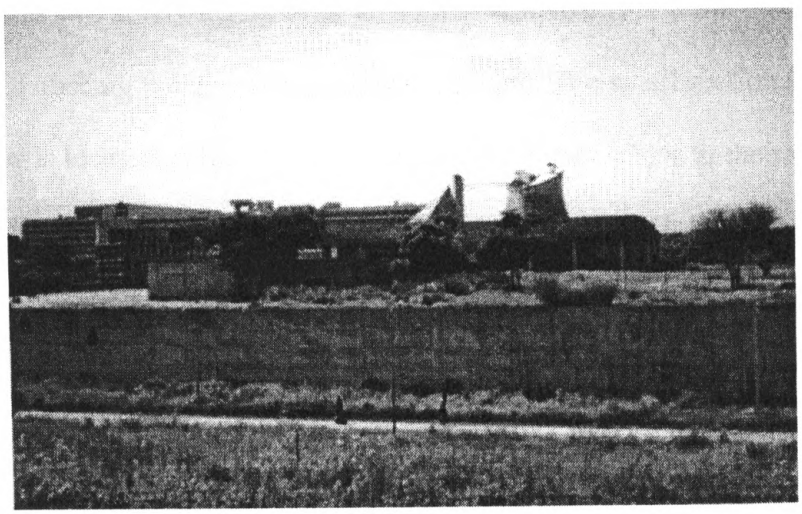


Fig.5.27 The Tower of Shadows in front of the Assembly Building.

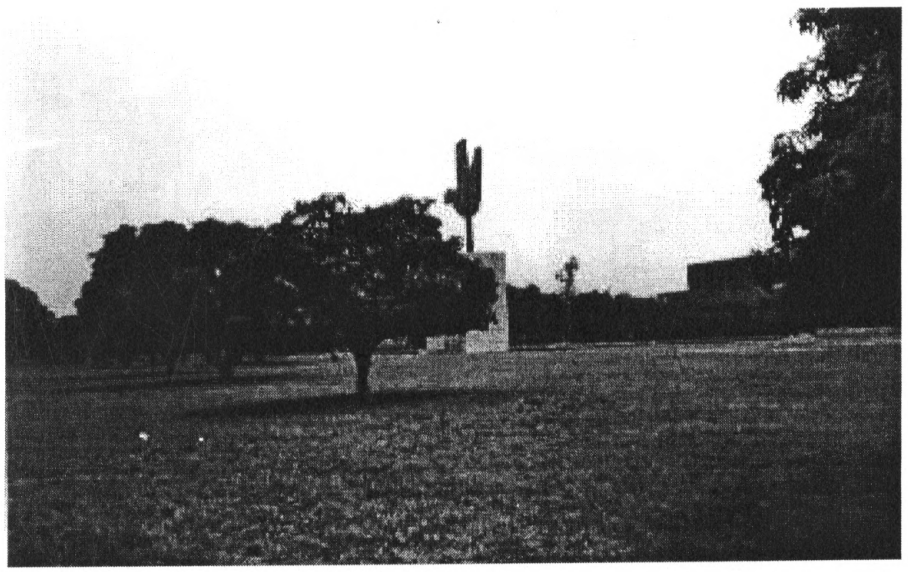


Fig. 5.28 The Open Hand Monument by Le Corbusier.

Another important part of the 'working' zone of the city is the Industrial Area. Le Corbusier was not in the favor of providing elaborate space for industry. According to him, Chandigarh was solely meant to be an administrative city and the provision of industry would obscure the original purpose of the city. The small section allocated to the Industrial Area is located in the south-east corner of the city, close to the railway station and sufficiently distanced from the residential areas of the city. Housing for industrial staff and labor is provided in the Sector 28 and 29, which are the nearest residential sectors. The Industrial Area is separated from the rest of the city by a buffer zone of fruit trees (Fig. 5.29).

Fig. 5.29 A buffer zone of fruit tress is provided between the Industrial Area and the Residential Zone, keeping the industrial pollutants and noise away.

The main commercial area of the city is the City Center, Sector 17, located at the junction of the *Madhya Marg* and the *Jan Marg* and forming the 'heart' of the city. It is the commercial as well as civic center of the city. Covering an area of 240 acres, it is broadly divided into two zones: the Northern Zone, which houses the Civic Administration of the city and the Southern Zone, which houses the District Administration. The City Center has a central piazza or *Chowk* around which the civic and commercial buildings are grouped together (Fig. 5.30). A slow vehicular traffic road circles the piazza with large areas for parking. The entire piazza and the shopping arcades are entirely pedestrian in nature and are linked to other sub-courts by covered walkways. The City Center is made up of two to four-storied concrete building blocks designed by Le Corbusier. All the buildings in the City Center follow strict architectural controls. Today the City Center is a very active urban space where people gather in the evenings.

Fig. 5.30 The City Center consists of commercial buildings grouped around a paved central piazza or *chowk.*

- **Care of body and spirit**

The main recreation and leisure zone, for 'care of the body and spirit', is formed by spacious parks and green spaces that run through the length of the city. These open spaces form the 'lungs' of the city, thus completing the biological analogy of Le Corbusier where the Capitol Complex is the brain or head; the City Center the heart; the Leisure Valley the lungs and the roads are the veins and arteries of the city.

FEATURES OF THE MASTER PLAN

- **Density**

The sectors are based on three main density groupings of 25, 50 and 75 persons per acre.[90] The sectors close to the capitol complex are for the bureaucrats and the wealthiest people of the city and have the lowest density. The sectors in the south of the city are the low-income sectors with greater population density.

In Chandigarh, Le Corbusier was not able to provide a very high density of living as proposed in the high-rise residential development for both the Contemporary and Radiant City. Vertical blocks on *pilotis*, which freed the ground for green spaces, formed the core of his ideas for both these projects. This kind of development was not practical in Chandigarh. This was partly because of lack of adequate technology and funds for high rise construction and also because Le Corbusier realized that traditionally, Indian cities were developed horizontally. The highest buildings in Chandigarh are only four stories tall. Thus, compared to the Contemporary or Radiant City, the population density of Chandigarh is very low. In fact compared to other cities in India also, the density of Chandigarh is very low. Such a low population density is also in part due to the introduction of a substantial amount of green spaces in the housing blocks or sectors. Thus, his idea of building in park-like setting still existed and was applied to Chandigarh, though at a much lower density.

- **Unity in detail**

Chandigarh is made of blocks called sectors that were basically uniform in detail. A grid of roads forms the periphery of the sector. The internal layout is also determined by a standard layout of roads, the only irregularity is exhibited by the V4 Shopping Street.

Within the sector, the housing blocks are laid-out according to strict guidelines and frame controls. All commercial development along the major roads is regulated by architectural controls. The basic purpose of the controls is to provide harmony in

[90] Evenson, Norma. (1966). *Chandigarh.* Berkeley: University of California Press. p. 46

construction, provide a uniform building line and height and to regulate projections on the façade.

- **Response to Climate of the Region**

The main factor considered in the design of Chandigarh is the harsh climate of the region. According to Maxwell Fry:

> *There is no surer way to a suitable architecture, and one that is in accord with the deepest realities of the country; for it is climate that dictates agriculture, moulds customs and affects even religion. Climate is a great element in India. To discover its laws and obey them is to create architectural character as directly as possible.*[91]

Housing was primarily designed for the hottest months of the year when most protection is required. Flat roofs were provided to be used as sleeping terraces, as is typical in traditional Indian houses. Locally manufactured bricks were used for most houses and many exteriors were left unplastered to reduce cost. Le Corbusier spent a lot of time studying traditional Indian housing for climate control methods as is evident in his study drawings for Chandigarh (Fig. 5.31). He used several elements, including the perviously developed *brise-soleil,* parasol, louvres and grilles, for sun protection. This is most evident in the Capitol Complex. Maxwell Fry and Jane Drew had already done a lot of research on building in tropical climates and were thus familiar with the climatic requirements. Their designs were a response to the climate of the region as is apparent in their design of housing, which incorporate elements like *chajjahs*, *jaalis*, sunbreakers, grilles and sleeping terraces.

[91] Fry, Maxwell. (1961). *Problems of Chandigarh Architecture.* In *Marg,* Dec.1961, Vol.15, No.1, p. 20.

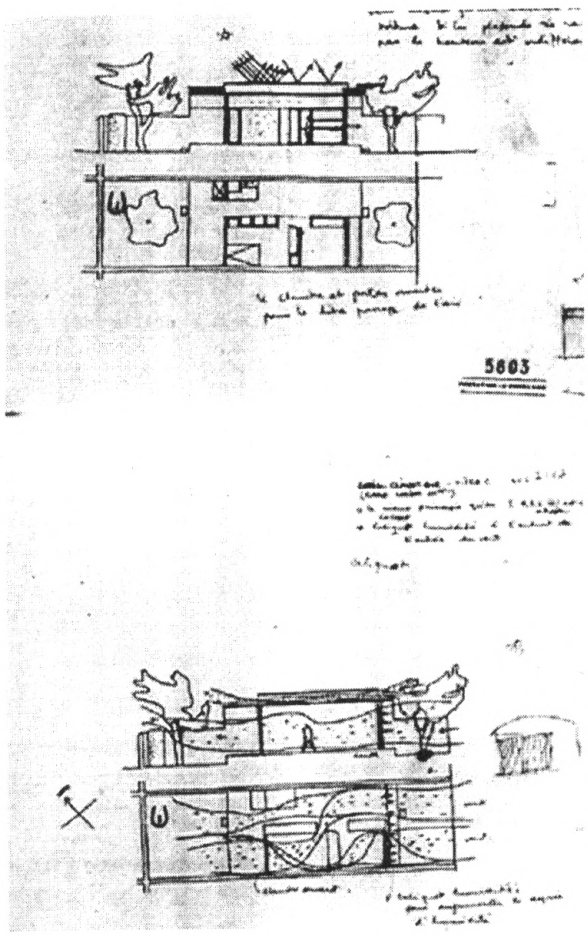


Fig. 5.31 Drawings by Le Corbusier to study climate control for housing in Chandigarh.

The landscape design of the city also responds to the climate. All the major roads are lined with shady trees that also add color to the cityscape. Details of foliage pattern along these roads were carefully worked out considering varying sun conditions and considering the shape of the crown, height and flowering characteristics of the trees (Fig. 5.32).

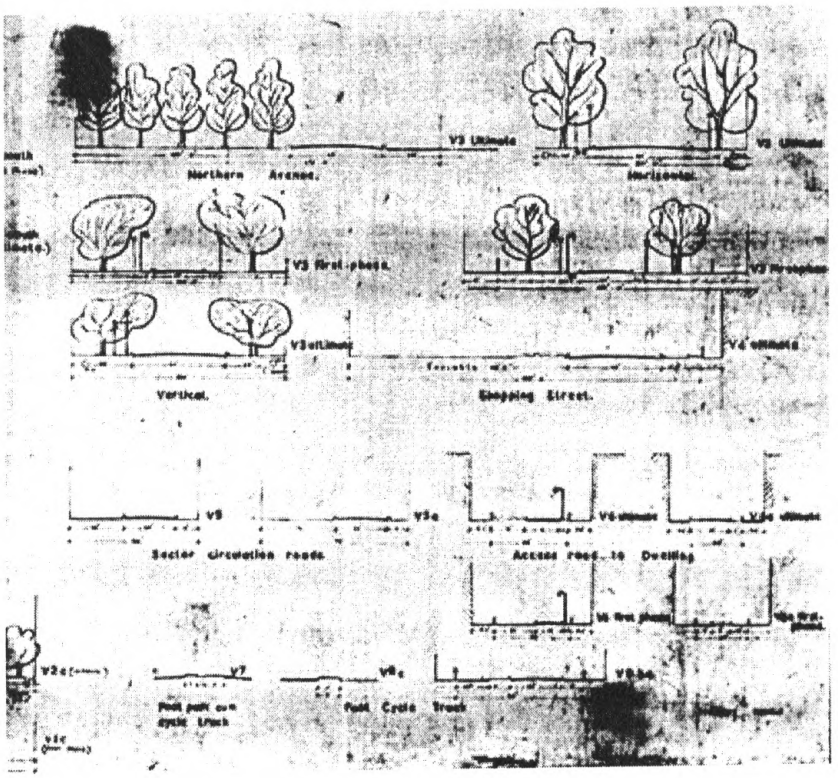


Fig. 5.32 Extensive study of trees and their foliage was undertaken for the landscape design of the city.

- **Verdure/Landscape an important element**

Landscape is an important element in the city. As explained above, all the seven-V's are shaded by carefully selected trees which add color to the otherwise relatively colorless cityscape. Planting plans for all the major roads and pedestrians paths were meticulously worked out. For the major car routes, single or double row of trees with light foliage starting high, are provided to permit the eye to travel across. Evergreen trees were selected to avoid frequent cleaning of fallen leaves. For pedestrian paths, multiple rows of dense foliage deciduous trees are provided, which provide shade in summer while letting the sun's rays pass through in winter. Different species of trees are planted along the vertical and horizontal V3 roads considering the sun's path in both directions.

The V4 shopping streets in different sectors are distinguished by planting trees with different colors of flowers. To give a more lively character, a mixture of evergreen and deciduous trees with different shapes and foliage, are planted along the shopping streets. Within the sectors, the interior roads have trees with beautiful flowers and varied foliage, the shape of the crown not being so important because of comparatively narrow roads.[92]

Instead of conventional traffic lights, the intersection of most major roads has a roundabout for the uninterrupted flow of traffic. The roundabouts are beautifully landscaped, adding variety and interest to the surroundings (Fig. 5.33).

To ensure that the city stays green, a Tree Preservation Order was passed which prohibited the cutting down or any form of willful destruction of trees. A green belt, called the leisure valley, was designed to run through the length of the city. The leisure valley runs along an eroded streambed running through the site. It is made up of parks and recreation spaces. Bicycle and pedestrian paths (the V7's) run through the leisure valley and one can traverse the length of the city on them. The leisure valley (Fig. 5.34 &5.35) starts in the foothills of Shivaliks, in Sector 1, where it is called 'Rajendra Park'. This park has facilities for long walks, outdoor yoga and horseriding. It then extends to Sector 3 where it forms the 20 acre 'Bougainvillea Garden', crossing into Sector 10. The prominent features of this part are the 'Sculpture Park' and the tennis stadium. Next the leisure valley joins the 'Rose Garden' in Sector 16. The Rose Garden leads on to Sector 23 leisure valley which has the 'Bal Bhavan' with an open-air theatre and a children's traffic park.

[92] Randhaw, M.S. (1961). In *Marg*. December 1961, Vol.XV, No.1, pp. 49-51.

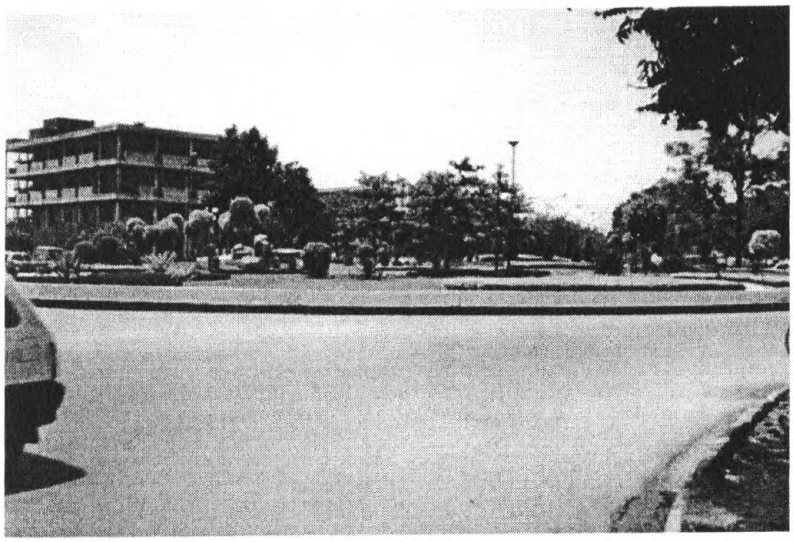


Fig. 5.33 Beautifully landscaped roundabouts adorn the city.

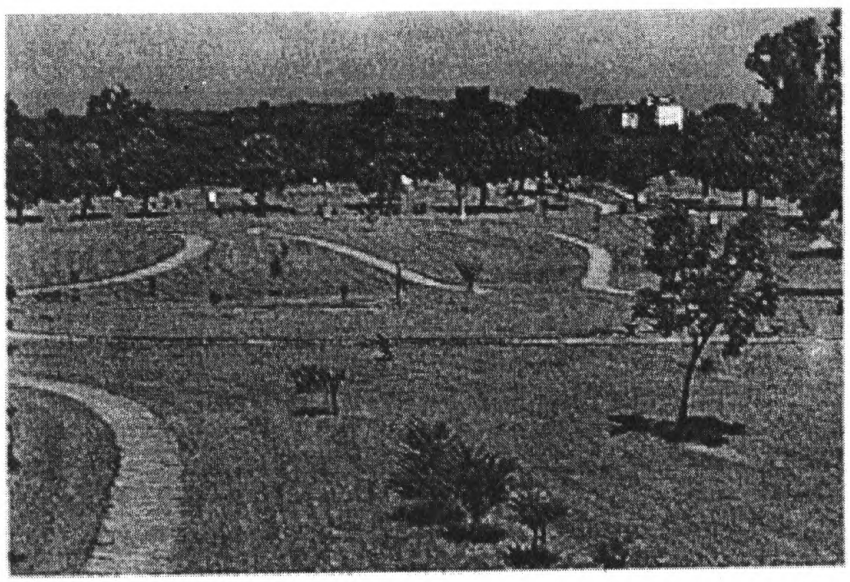


Fig. 5.34 The Leisure Valley, with its pedestrian and bicycle tracks.

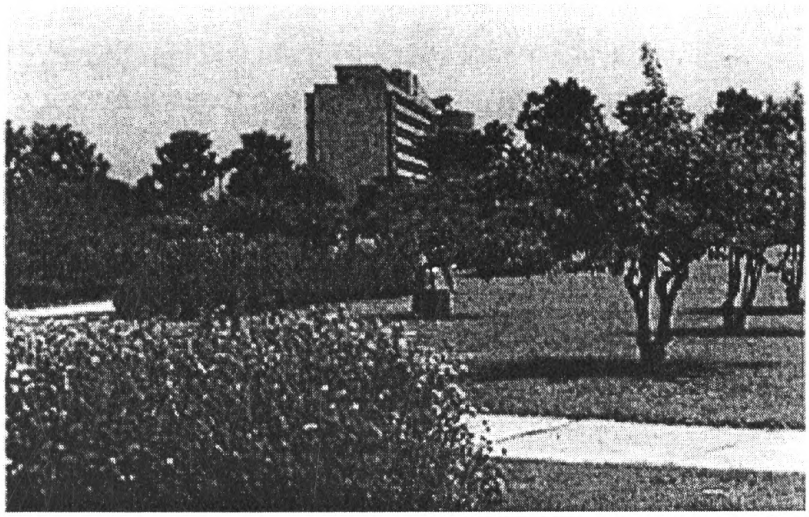


Fig. 5.35 The Bougainvillea Park forms a part of the Leisure Valley.

The intentions of Le Corbusier to make Chandigarh a green city were successfully carried out even in the Second Phase of Chandigarh, where the concept of the leisure valley was not abandoned despite pressing needs for land to house the growing population. From Sector 23 the leisure valley was extended to Sector 36 where it forms the 'Hibiscus Garden'. From here it leads to Sector 42 which has the 'Garden of Rare Plants', before terminating at the southern most edge of the city in Sector 53.[93]

At the northeast edge of the city an artificial lake was created by damming one of the seasonal rivulets, the Sukhna Choe. This lake was subsequently called 'Sukhna Lake' (Figs. 5.36 & 5.37). The lake, with its verdant surroundings and an unimpeded view of the mountains, forms an ideal recreation space.

All sectors have abundant green areas provided at regular intervals. Provision of setbacks on all plots also encourages planting of medium sized trees and shrubs in house gardens. A buffer belt of fruit trees separated the Industrial Area from the rest of the city. Rows of trees screened the industry from the main road and reduced the transmission of

industrial smoke and pollutants into the city. Thus, Le Corbusier's conviction of- sun, space and greenery was important in giving character to Chandigarh.

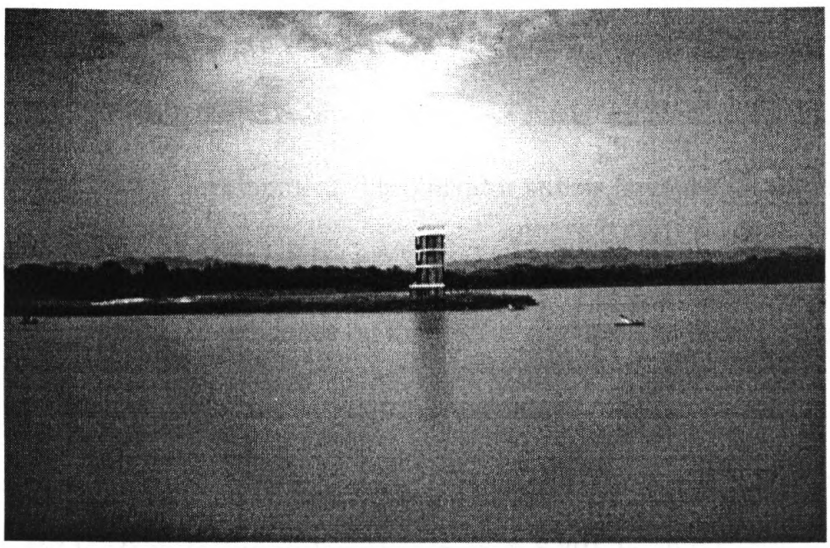


Fig. 5.36 Sukhna Lake, at the head of the city, forms an ideal recreation space.

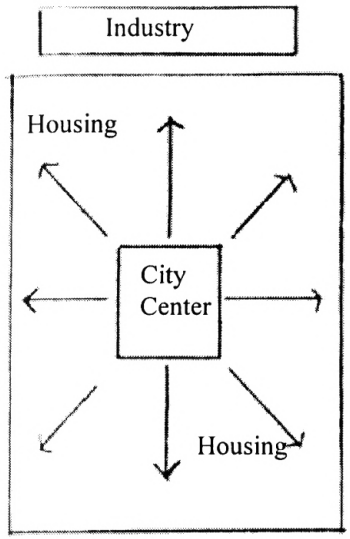
Fig. 5.37 The piazza in front of the lake is beautifully landscaped.

[93] CITCO. (1998). *Chandigarh: Atlas and Guide.* Chandigarh: CITCO.

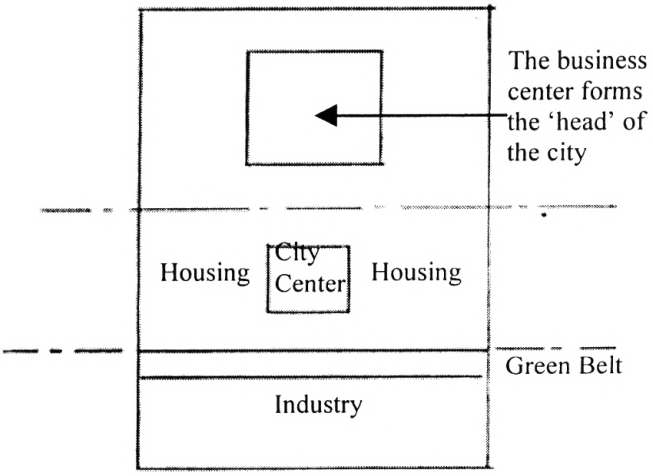
Removal of corridor-street

Indian cities are traditionally dense agglomerates of multi-use spaces that are designed along narrow streets, vibrant with activity. Chandigarh contradicts such an informal layout. The streets are very wide and there is a general uniformity in the street façade as dictated by the frame controls. The main roads are wide tree lined avenues and do not have any frontal development. The corridor streets have thus been removed and replaced by high-speed traffic roads.

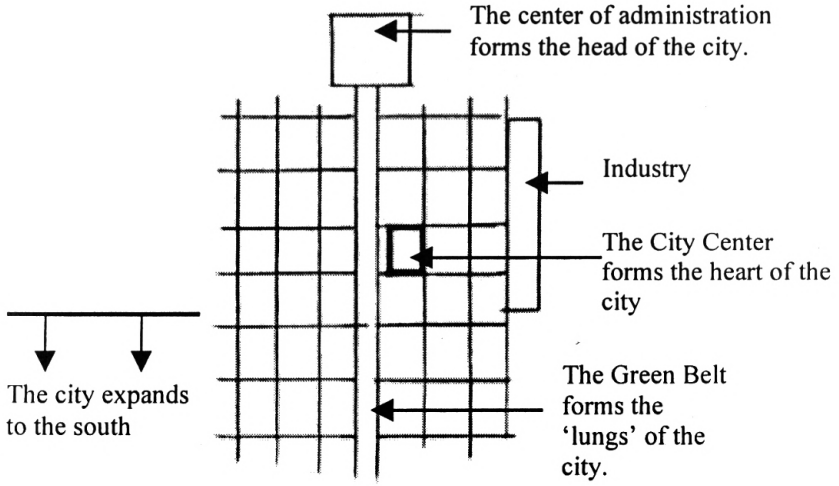
There is a strong dependence on the traffic segregation system to generate the overall form of the city. This kind of dependence on the traffic system is also very strong in his designs for Contemporary City and Radiant City. The plans of the three cities have been compared for their traffic system (Fig. 5.38 & 5.39). In all three, one can see a strong predilection for axes and the dominance of straight lines. There is variation in the plan of Chandigarh, where the V5 road curves for practical reasons.



The Contemporary City is a concentric city with the City Center forming the 'heart' of the city.



The Radiant City is a linear city with distinct linear zones that can expand horizontally.



The ideas from both the Contemporary and Radiant City are combined in the design of Chandigarh.

Fig. 5.38 A comparison of the Contemporary and Radiant City with Chandigarh.

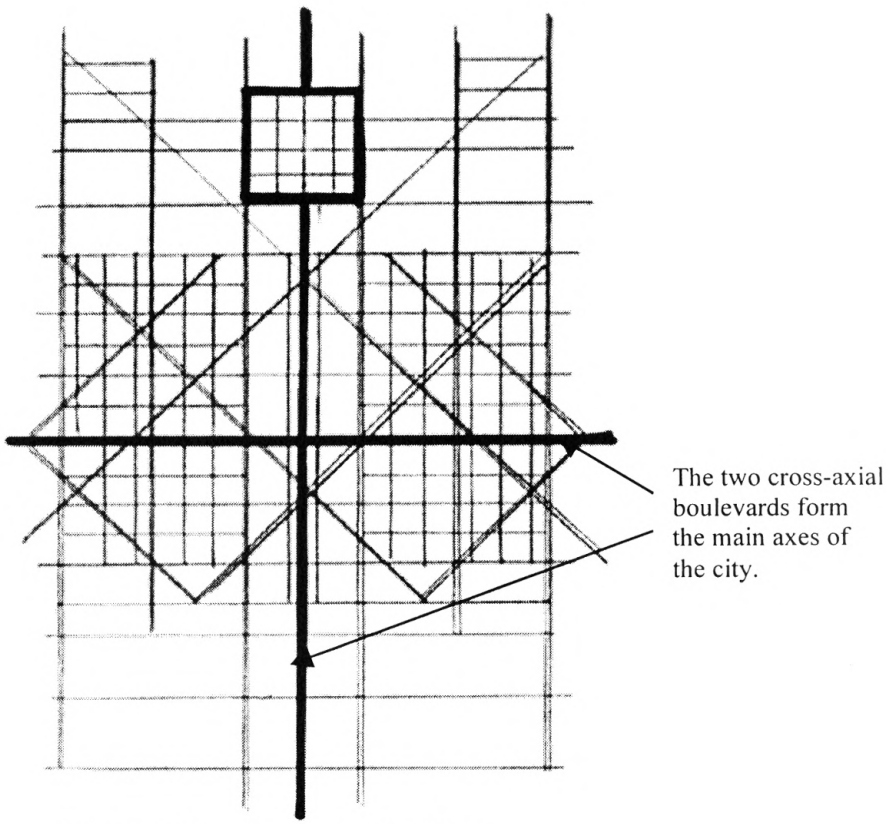


Fig. 5.39 Comparison of the road network of the Radiant City and Chandigarh.

CONCLUSION

There is a general consistency in Le Corbusier's urban design ideas, with features that persist in all the three major urban design projects. The ideas presented in his first urban project, the Contemporary City are reflected even in Chandigarh and so are ideas from the Radiant City. Some of the elements in Chandigarh differ from those in his earlier designs in response to the climate and the social, cultural, political and economic conditions of the city. Several of his ideas could not be translated in the design of Chandigarh because of lack of adequate technology and lack of funds. But the spirit of the city is very 'Corbusian' in nature, based a lot on the utopian socialist ideas that persisted in his urban design development. There is a clear differentiation between the monumental and normative fabric of the city. The monuments, scattered in the capitol complex park, are clearly segregated from the rest of the city and given the seat of honor at the top of the plan, raised on an artificial hill and with the most exalted view. The rest of the city structure is defined by a clear segregation into functional zones. The modernist paradigm of dividing the city into functional zones thus forms the basis of the urban fabric of the city. Such an idea, later rejected by contemporary designers, is also responsible for some of the shortcomings of the Chandigarh plan.

Chandigarh, through its short fifty years history, has received both positive and negative criticism. Most commonly, it has been censured as being insensitive to the culture and tradition of India. While this statement can be argued, it is important to remember that Chandigarh was never intended to be a traditional city by its patrons. This is reflected in a statement by Pandit Jawahar Lal Nehru on the inauguration of Chandigarh:

Long years ago we made a tryst with destiny, and now the time has come when we shall redeem our pledge, not wholly but in full measure. At the stroke of midnight while the world sleeps, India will awake to life and freedom. A moment comes, which comes rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a nation long suppressed finds utterance.

The city has often been criticized for its visual monotony (which is defined as uniformity or unity by Le Corbusier), its low density and the vast areas devoted to circulation. Nevertheless, the people of Chandigarh are proud of their city and speak of it with much enthusiasm and affection. The clean, quiet, green and relatively pollution free environment (compared to other cities) is a source of pleasure for the inhabitants. Most of them recognize the need for their contribution to preserve it and are actively pursuing means to do that. In spite of all the problems the city is facing, the inhabitants are still appreciative of the city.

CHAPER 5.2

A SECTOR IN CHANDIGARH

Within the larger fabric of the city, it is important to study the normative fabric and its related functions. For this purpose the nature and structure of a 'sector', the neighborhood unit of the city, is analyzed, followed by a detailed description of housing in the city.

Structure of a sector

A sector in Le Corbusier's plan is a neighborhood unit creating physical and social units of smaller and manageable size.[94] Most of the sectors are rectangular and measure three quarters of a mile (1200 meters) in length and half a mile (800 meters) in breadth, covering an area of almost 240 acres. Notable exceptions to this are sectors 2 to 6 that measure quarter mile by half a mile and cover an area of 65 acres each. The size of the sector, based on the Spanish *cuadra*, was not an arbitrary choice but, "issued from an ancestral and valid geometry established in the past on the stride of a man, an ox or a horse, but henceforth adapted to mechanical speeds."[95]

Based on a geometric framework, the sectors are formed by a well-organized grid of seven categories of road systems. The longer roads run from north-east to south-west following the direction of the natural slope of the site. The shorter roads run from east to west in the direction of the prevailing breeze.[96] The grid roads, catering solely to fast moving traffic, enclose the sectors forming rigid boundaries. From these V2 or V3 grid

[94] Evenson, *Chandigarh*, p.45.
[95] Le Corbusier, quoted in: *Sarin*, p.50.
[96] D'Souza, Victor S. (1968). *Social Structure of a Planned City, Chandigarh.* New Delhi: Orient Longmans Limited. P.6

roads, the sector is entered only at four points, which then join the interior V5 loop road. From the loop road a network of smaller V6 roads lead to individual houses. The sector is bisected internally by a V4 *Bazaar Street*[97] (Shopping Street). The V4 roads of adjacent sectors are linked together to from a continuous shopping belt in the east-west direction. Each sector had its own shopping complex, schools, health center, places of worship and those for recreation in the form of a central park-band. The sectors are thus inward looking with all basic facilities provided within the sector. Transit traffic takes place outside the sector and no house opens onto fast moving traffic, for the safety of the residents. The connection to adjoining sectors is provided by the park strip running north-south and by the Shopping Street running east-west. Apart from this, the sectors are treated as individual entities.

Within the overall context of the city, the sectors are organized on the basis of the economic status or civil service rank of the residents. Such a division of sectors on a socio-economic basis is clear from the distribution of plots in various sectors (Fig.5.40). Most of the bigger size plots, with area 6 *kanals*[98] or more, are distributed in the first row of sectors (sectors 2-5). These form the high-income group sectors with very few medium sized (1 *kanal* to 5 *kanal*) plots and almost no small sized (less than 1 *kanal)* plots. The second row sectors (sectors 7-11) contain mostly medium sized plots and a few large sized plots. The third row of sectors (sectors 14-19, 27 and 28) consist mostly of medium sized plots and a few small sized plots. The fourth row of sectors (sectors 20-25, 29 and 30) contains mostly small sized plots, a few medium sized plots and no large sized plots. Thus, the socio-economic hierarchy follows north to south, with the sectors closer to the

[97] The term *bazaar* is an indigenous expression for a market place or shopping arcade.
[98] *Kanal* is a local term used to describe the plot size. In measurement, 1 *kanal*= 500sq. yards.

'citadel', the Capitol Complex, being the high-income, low-density sectors. Apart from this, there is no striking pattern of settlement on the basis of kinship or caste in Chandigarh, as is typical in traditional Indian cities.

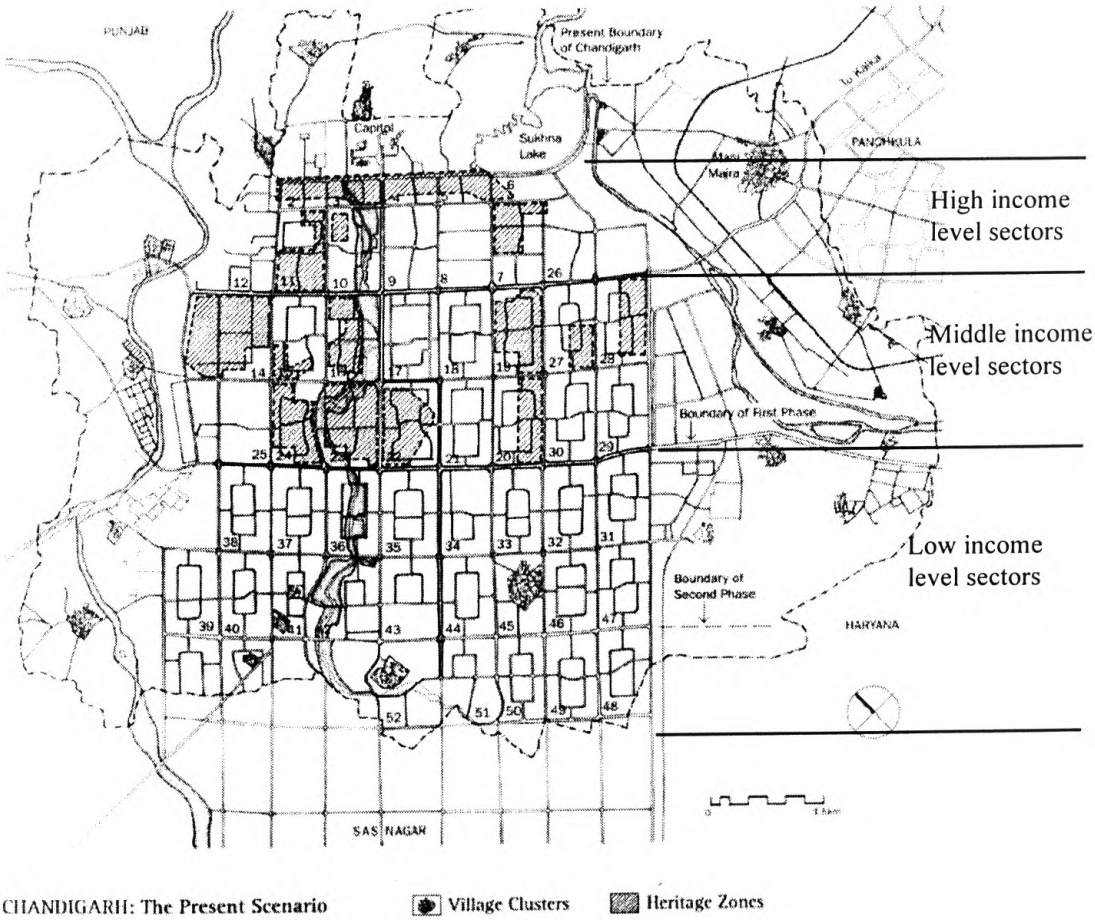


Fig. 5.40 Hierarchy of housing and sectors in the three phases of Chandigarh.

The sectors were based on three main density groupings of 25, 50 and 75 persons per acre. Conforming to the size of plots, the sectors closer to the capitol complex were the low-density sectors, with the density increasing to the south. This is clear from the census information provided in Table 5.1. According to the 1991 Census of Chandigarh, the highest population density in the first row of sectors, from Sectors 2-6, is only 8.25

persons per acre in Sector 5, whereas, the highest population density in Chandigarh reaches 95.70 in Sector 20. Thus, there is a high margin of difference in the population density of various sectors in Chandigarh, which corresponds to the average income level of the residents of the sector.

TABLE 5.1
Census Information on Chandigarh

Category	Census of 1971			Census of 1981			Census of 1991		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Area Covered (Sq. Km.)				114	45.67	68.33	114	36	78
Area Covered (Acres)				28500	11417.5	17082.5	28500	9000	19500
Population	2,57,251	24,311	2,32,940	451,610	28,769	422,841	6,42,015	66,186	5,75,829
Population Density (per Sq. Km.)				3961	630	6188	5632		
Population Density (per acre)				15.844	2.52	24.752	22.528		
Decennial Population Growth				75.55	18.34	81.52	42.16		36.18
Percentage of Urban Population				93.63	6.37	93.63	89.69		
Literacy Rate				64.79	44.73	66.15	77.81		
Number of Occupied Residential Houses				98,893	5883	93,010	1,45,418	18,191	127,227
Number of Villages				27		27	25		
Number of Towns				4		4	5		

Functionally, the city is divided into zones, devoted to six categories of major land uses.[99]

1. Administrative Area
2. Commercial Area
3. Industrial Area
4. Educational Center
5. Residential Area
6. Green Belt, parks and playgrounds.

[99] *D'Souza.* p.7

1. Administrative Area

Located against the backdrop of the picturesque Shivalik hills, the Capitol Complex in Sector 1, designed by Le Corbusier, forms the citadel of the state government. The Capitol Complex (Fig.5.41) consists of the High Court, the Assembly Building, the Secretariat and several monuments placed on a cross axis in a vast pedestrian plaza. Conceived at a monumental scale, the Capitol Complex uses a combination of artificial hills and trenches to differentiate the vehicular and pedestrian spaces and to symbolically elevate the Capitol Complex to the highest position in the city. The individual buildings along with the monuments, the Open Hand and the Tower of Shadows, were designed by Le Corbusier to match the grandeur expected of a capital city. All the buildings are unique in design, the unifying elements being the climate control devices and the material, which is exposed reinforced concrete. The Capitol Complex, perched at the top of the plan, occupies the most prestigious position in the city. Sandwiched between the beautifully landscaped Rajendra Garden on one side and Sukhna Lake on the other, it is segregated, almost hidden, from the rest of the city by the use of artificial hills. Symbolically the head of the city, it is also the most monumental.

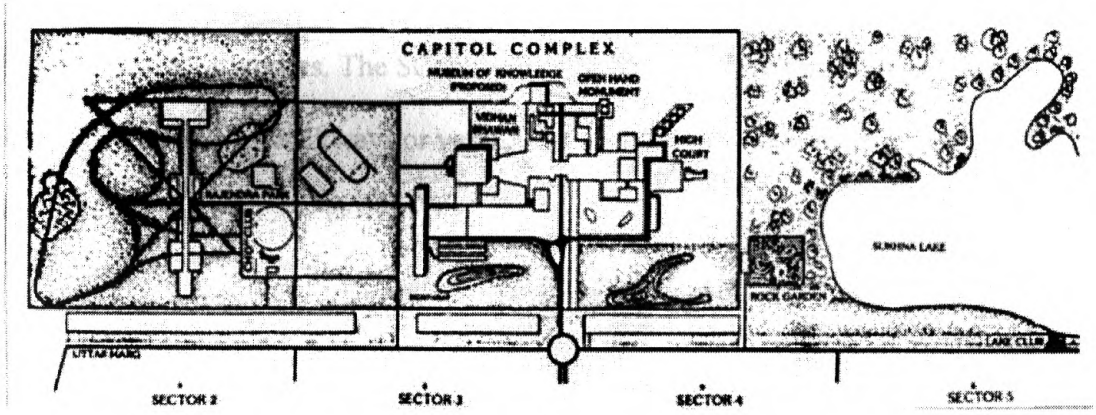


Fig. 5.41 Plan of Sector 1, the Capitol Complex placed between Rajendra Park and the Lake.

2. Commercial Area

Sector 17, located almost at the center of the plan of the first phase, forms the chief commercial area or the City Center. The City Center (Fig.5.42) is composed of a series of chowks (piazzas) which are enclosed by reinforced concrete buildings two to four storeys high, with shops on the ground floor and offices above. The north part of the sector forms the main recreational area with three cinema halls in close proximity. Next is the strip containing several government offices, banks, postal services and the state library. To the south is the main commercial area, designed around a paved piazza or *chowk*. The piazza paved in concrete, is a vast barren stretch, with only a water fountain in the center to ameliorate the otherwise lack-luster space. There is a marked absence of greenery in this market piazza and on a warm sunny day, the heat is almost unbearable. There is complete segregation of pedestrian and vehicular traffic movement in the City Center. No vehicles are allowed in the piazza. Several parking lots are provided at various spots in the sector.

The buildings in the City Center conform to strict architecture controls. The shop-cum-office (SCO) building blocks (Fig.5.43) bordering the piazzas are designed in reinforced concrete frame with predetermined floor to floor height and built to a maximum of four storeys. The SCO's along the V4 roads are three storeys high. All SCO's have covered walkways or verandahs, at the front and rear for pedestrian movement.

The south part of the sector is multi-functional. It contains the district courts, police headquarters, the local and inter-state bus terminal, a football stadium, and an exhibition ground.

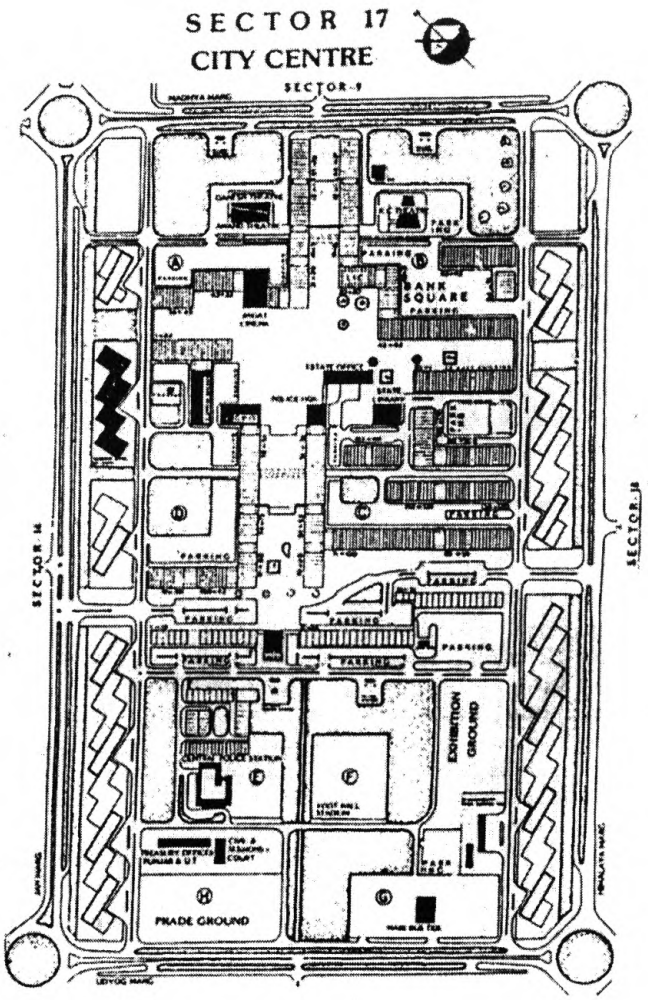


Fig. 5.42 Sector 17, the City Center forms the 'heart' of the city.

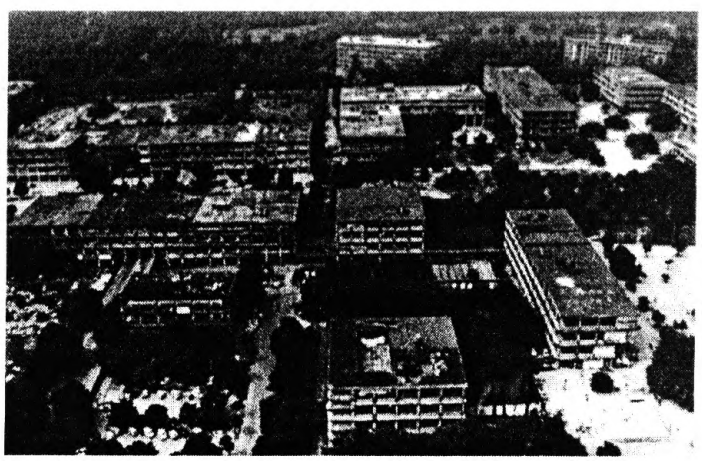


Fig. 5.43 An Aerial view of the four-storeyed buildings in Sector17

The City Center has been labeled by many as being harsh and unattractive. It is true that the buildings, with their *beton-brut* appearance, do present a monotonous appearance. The shopping complex lacks the variety and vitality that is characteristic of traditional Indian cities. There was no space provided for low-income enterprises like handicrafts, street vendors and hawkers, which are very common in India. This has not stopped them from operating. Street vendors today spread their wares in the verandahs in front of the shops and in the piazza. The vast, concrete piazza with almost no greenery or shade trees is unbearably hot in the daytime. The piazza is more amenable in the evening when the temperature is more bearable.

There are several other commercial areas that city supplement the City Center. They are the shop-cum-office (SCO) and the shop-cum-flats (SCF) in Sector 22, SCO's along Madhya Marg, the fruit and vegetable market in Sector 26, the local markets in each sector and the Rehri Markets that have cropped up in various sectors. Rehri Markets are illegal market places that consist of temporary shops or vending carts, run by people who cannot afford regularly constructed shops in the main markets.

3. Industrial Area

Chandigarh was conceived primarily as an administrative and educational center and Le Corbusier always stressed keeping industry to a minimum. In the document, "For the Establishment of an Immediate Statute of the Land", Le Corbusier remarked:

> *Chandigarh is a Government city with a precise function and, consequently, a precise quality of inhabitants. On this presumption, the city (metropolis)—it must not lose its definition. Some people say that life must come in the city from other sources of activity, especially industry—but an industrial city is not the same as an administrative city. One must*

not mix the two. It seems that the original definition should be complimented by the possibility of introducing elements which can reinforce the functions of the city, rather than create a conflict of rivalry.[100]

Thus, the provision of industry was not a major concern for Le Corbusier. Only 136 hectares of land was provided for light industry. The Industrial Area was designed in two phases. Both are located on the eastern edge of the city, in close proximity to the railway station to facilitate the transfer of goods. The city is buffered from the industrial area by mango groves. Housing for workers is provided specifically in sectors adjoining the Industrial Area to reduce commuting distance.

With the city lacking a viable industrial economic base, the growth of industry was inevitable. To generate capital, the government started giving incentives to specialized industries. As a result, the role of Chandigarh as an industrial center has grown. Due to the scarcity of industrial land, much of this industry is sited in the adjoining township, SAS Nagar and Pinjore.

4. Educational Center

As intended by the designers, Chandigarh, with time, has become the educational center of the region, with several technical and specialized educational institutes, including a school of architecture. The main educational areas are concentrated on the north-eastern edge of the city along the *Madhya Marg*. Most prominent amongst them is the Punjab University (Figs.5.44 & 45), in Sector 14, designed by J.K. Chowdhury. Sectors 10, 11 and 12 have several higher education institutes including the Punjab

[100] Quoted in *Sarin.*

Engineering College and the Chandigarh College of Architecture (Fig.5.46). Apart from the specialized institutes, most sectors have primary and secondary schools, making them self-sufficient neighborhoods.

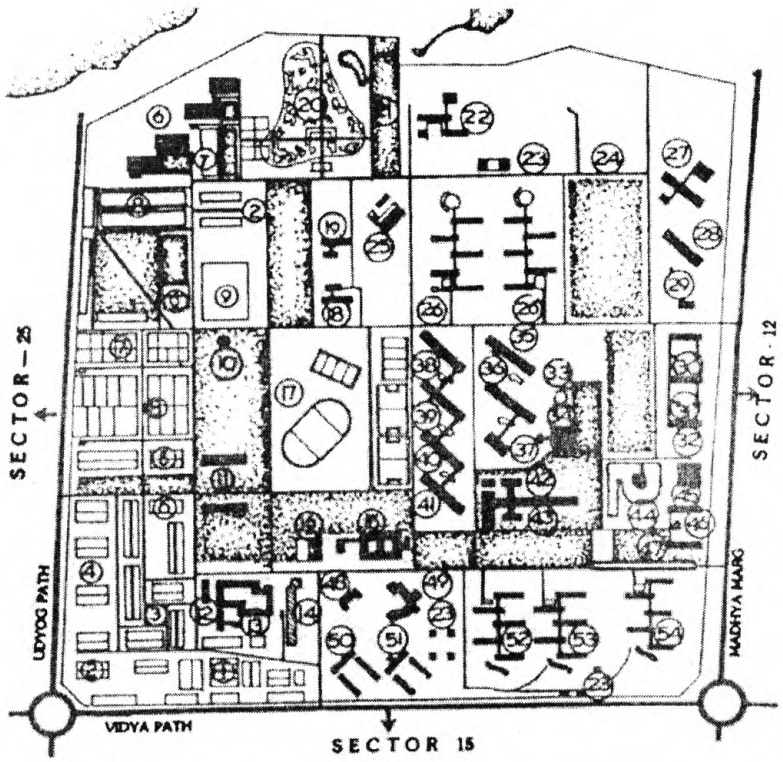


Fig. 5.44 Plan of Punjab University, Sector 14, by J.K. Chowdhury.

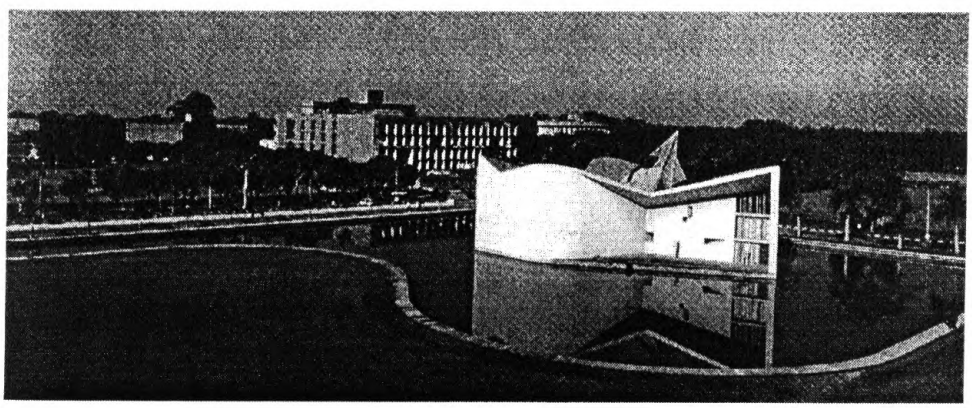


Fig. 5.45 The university complex, with Jeanneret's Gandhi Bhawan in the foreground.

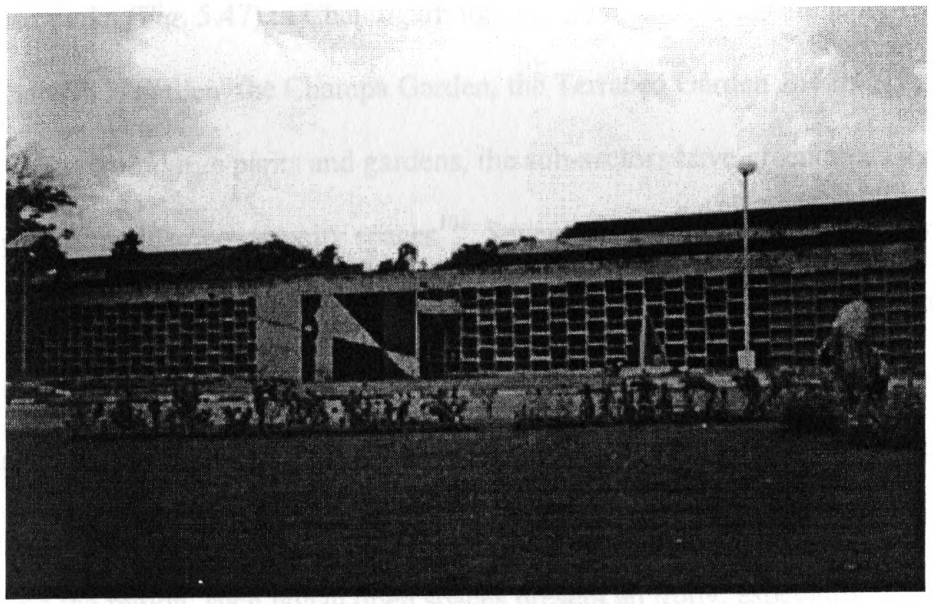


Fig. 5.46 The Chandigarh College of Architecture reflects the character of the city.

5. Residential Area

The residential units in sectors are arranged along a grid of V6 roads. They are built on plots of predetermined sizes and with rigid controls and bye-laws set by Le Corbusier and his team. Housing in Chandigarh is of two types: government and private. Most of the government housing was designed by Le Corbusier's architectural team consisting of Pierre Jeanneret, Maxwell Fry and Jane Drew. For private housing, plots of land, provided with the necessary infrastructure, were sold to interested individuals.

6. Green belt, parks and playgrounds

Each sector is provided with green spaces that form the leisure and recreation spaces of the city. A prominent feature of the master plan is the siting of a green belt, called the Leisure Valley, on the bed of a seasonal rivulet. This linear park runs through

the whole of Chandigarh and is now over 8 kilometers long. There are several well-maintained parks (Fig. 5.47) in Chandigarh today. Some of them are the Rose Garden, the Bougainvillea garden, the Champa Garden, the Terraced Garden and the Topiary Garden. Apart from large parks and gardens, the sub-sectors have green areas that can be used as playgrounds or community spaces[101]. Several incidental spaces at the corners of housing blocks or between sub-sectors are also developed as green areas. An abundance of open spaces in combination with low building heights, is responsible for the relatively low density of Chandigarh as compared to other cities of India. It is also one of the cleanest and least polluted cities of India. But, in view of the increasing population of the country and the region, such lavish open spaces present an irony, especially when most of these open spaces lie in a state of neglect (Fig. 5.48) due to a lack of funds for maintenance. In several sectors, the incidental open spaces are occupied by the homeless, who have constructed temporary residences, called *jhuggis*. Thus, to some extent the purpose of these open spaces has been negated to suit to the urgent needs of the population, transforming them into urban squatter settlements.

[101] In a lot of instances such community spaces are used for weddings, parties and religious festivals.

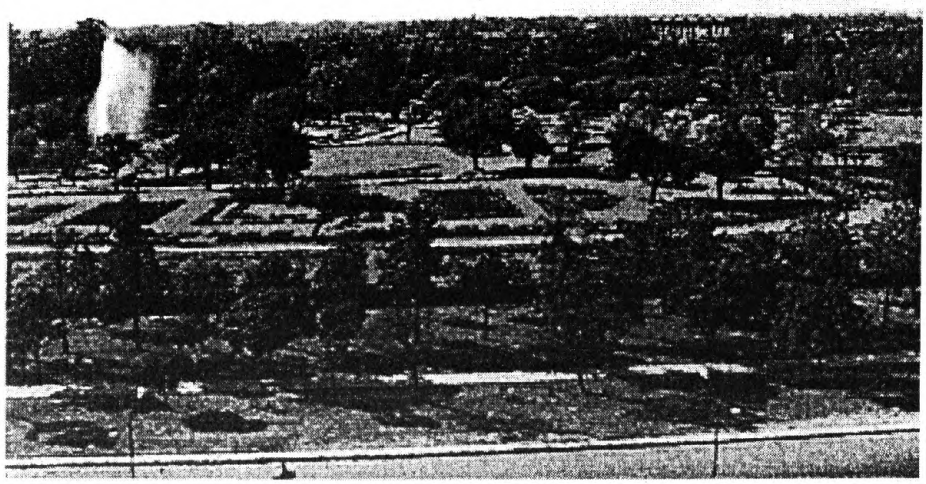


Fig. 5.47 One of the well-maintained parks in Chandigarh.

Fig. 5.48 Many open spaces in Chandigarh lie in a state of neglect due to lack of funds.

CONCLUSION

From the organization and layout within a sector, it is evident that even within each sector, there is a clear demarcation into various functional zones: living, working, care of body and spirit and circulation. The periphery and the center of the sector are devoted to 'working', the green area running north-south to the provision of 'care of body and spirit' and the rest of the area to 'living'. All areas within each sector have a predetermined use and the zoning laws prohibit any other use. These four functions translated in the design of Chandigarh work well as individual entities but as a cohesive whole they seem to fall apart. There has been much attention paid to the individual details of these elements but their correlation is not clear, especially when viewed in the Indian context, where multi-use spaces are the norm.

CHAPTER 5.3

HOUSING IN CHANDIGARH

In any city, it is the housing that forms the biggest component of the urban fabric, both as an individual dwelling unit and in layout as part of the normative fabric of the city. It is surprising that the housing in Chandigarh did not receive much input from Le Corbusier. It was left entirely up to the design team of Pierre Jeanneret, Maxwell Fry and Jane Drew, who were assisted by a team of Indian architects. Housing in Chandigarh can be divided into three major groups according to their ownership:

1. Government housing with plot size ranging from 10 *kanals* (5000 square yards) to 2 ½ *marla* (62.5 square yards).
2. University housing.
3. Privately owned houses with plot size ranging from 10 *kanals* to 5 *marla* (125 square yards).[102]

Most of the government and university housing was designed in the first phase of Chandigarh. For private housing, plots were allotted on which construction was to be carried out according to the frame controls and building bye-laws. The development in Chandigarh, unlike most Indian cities, is strictly regulated by several pieces of legislation listed below.

1. 'The Capital of Punjab (Development and Regulation) Act, 1952, is the most important legislation, which lays down rules and regulation for all kinds of construction in the city.

2. The Zoning Plans and the Architectural Control Sheets.
3. The Punjab New Capital (Periphery) Control Act, 1952 which controls the growth and development of the city. According to the Periphery Control Act, any area within a distance of five miles on all sides of the city is a controlled area where no construction is allowed.

It is the Zoning Plans and Frame Control Sheets that lay down specific guidelines for housing design. Frame controls for plot sizes up to 10 *marlas* (250 sq. yards) are the most important controls for housing in the city. To ensure a standard terrace formation in housing, the frame controls fix the extent and height of the party walls and a top course connecting these. All construction is to stay behind his frame. The frame controls are in the form of sheets showing graphically the building lines, permissible heights, buildable areas, open spaces, scheduled trees, boundary wall and entrance gate design. Their purpose is to provide harmony in construction by specifying a uniform building line and regulating the building height and projections on the façade. To a large extent, the controls have been effective in providing visual coherence to the street facades.

Government Housing in Chandigarh

It was the government housing that was first developed in Chandigarh and thus set precedents for most subsequent private housing developed later. Most of the government housing was designed by Pierre Jeanneret, Maxwell Fry and Jane Drew, assisted by a team of Indian architects. The program for government housing demanded thirteen categories of housing for the government employees to be stationed in the new

[102] *D'Souza.* p.9

capital city. The housing was scaled to the income of the government employees. At a later stage a fourteenth category, "Type 14", was added. Type 14 (Fig.5.49), marking the minimum standard of housing, constituted "cheap houses" built at a cost of Rupees 2400. Type 1, the highest category of housing designed for the Chief Minister, cost around Rs.250, 000 (Fig. 5.50). Housing plots ranged from 114 square meters to 4,500 square meters, the ratio between the smallest and largest plot sizes in the city being approximately 1:50. This ratio was more egalitarian than the ratio of around 1:1000 which was common in most Indian cities at the time of Independence. Thus, the architectural team attempted to narrow the gap between the upper and lower echelons of Indian society by manipulating housing provision in the new city.[103]

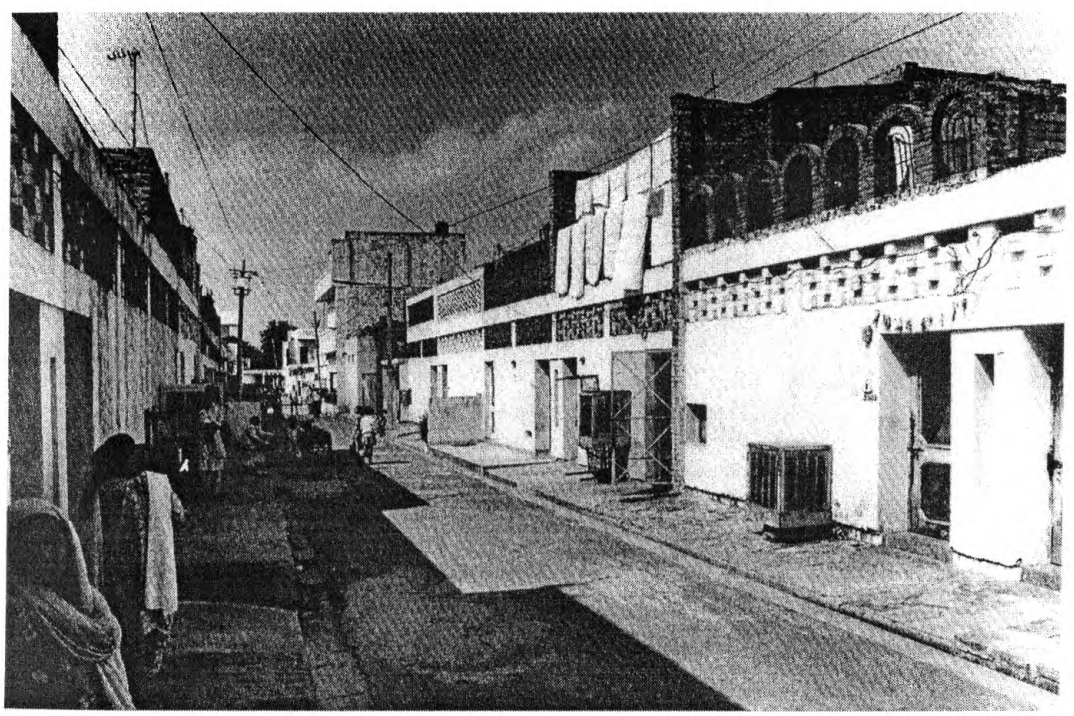


Fig. 5.49 Type 14 housing, designed by Jane Drew, forms the lowest category of housing.

[103] Refer to Sehdev Gupta's article in *Ekistics 235* details.

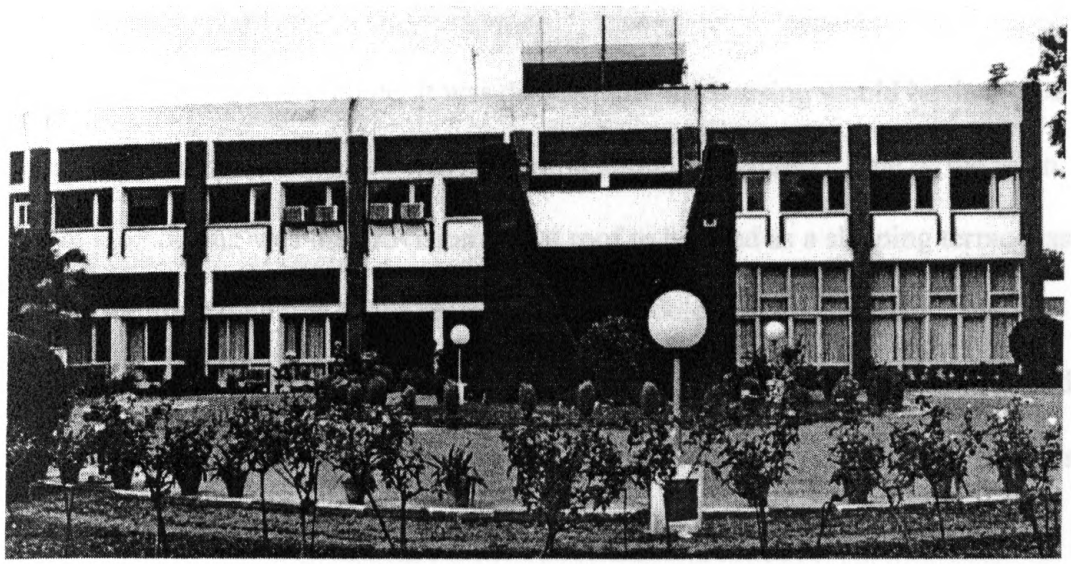


Fig. 5.50 Type 1 house for the Chief Minister, designed by Pierre Jeanneret.

The design of housing in Chandigarh was a complex task, with several factors to be considered. The major factors governing the design of housing in Chandigarh were:

- Climate
- Economy and Building Technology
- Social patterns[104]

Climate

The most compelling factor in the design of housing was the harsh climate of the region. Summers in Chandigarh are harsh with temperatures rising up to 45 degrees centigrade with hot winds blowing for most of the summer. Winters are cold and dry, with temperature dropping to almost freezing. Heavy rains lash the region from June to September, when heat and humidity make for an unbearable combination. Climate, in

Chandigarh, is thus one of extremes, making it very difficult to design satisfactorily for all seasons.

After reviewing the climate, it was decided that the housing would be designed for the hottest months of the year when most protection was required. One of the main features of the housing was the provision of flat roof to be used as a sleeping terrace, as is common in traditional houses of the region, owing to cooler night temperatures and pleasant night breezes. The sleeping terrace is provided with a *barsati,* a small enclosed room on the terrace, in which *charpoys* (woven cots) could be stored. Openings in walls were kept to a minimum and were further protected by shading elements such as sun-breakers, grilles, louvres and overhangs. Perforated screens called *jaalis,* were provided to block the hot afternoon sun while allowing breeze to flow through. In the first few houses, covered porches called *verandahs* were provided for sleeping outside during the rainy season. Being a costly solution, *verandahs* were omitted from later designs. Attention was paid to the creation of cool interiors and the protection of main living spaces from the harsh southwestern sun. Careful orientation of the main living spaces was thus used to protect the house from harsh climate.

Economy and Building Technology

Economy of construction was an important factor in the design of government housing. To reduce cost, housing up to Type 8 was built as row housing with common cross-walls. The price of each housing type was fixed and an effort was made to stay within it. Cost savings were sought by the use of local materials and labor. Cost was minimized by the use of locally manufactured bricks, precast concrete and local stone.

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[104] Evenson, *Chandigarh,* Chapter VII.

The use of such traditional materials was also necessitated by the high cost of steel. Labor cost was reduced by using local labor for construction instead of relying on skilled labor and technicians required for reinforced concrete and steel construction. Brick was used imaginatively in arched porches, screen walls and projections on the façade, which also served to shade the walls. The exteriors were left in exposed brick to save on plastering cost. Brick was used instead of concrete and steel even for small elements like parapets, balustrades and sun-breakers. Additional savings were achieved by standardizing spans for roofs so that the same shuttering units could be used for construction throughout the city.

Social Pattern

The prime task for the architects, foreign to the setting, was to understand the social patterns and indigenous architecture of the region. At that time most of Punjab was rural based and the team realized that local architecture had to be modified to respond to a shift from rural to urban condition. The social pattern was, thus, an important element in the design of housing in Chandigarh. Provisions were made for the social structure of the majority Hindu population. The architects visited nearby villages to get cues and spent time talking to future residents of the city to get some idea of their needs. According to Maxwell Fry:

> *In meetings we had with typical groups of our new clients, drawn from different grades, we learnt the intricacies of Hindoo religious observance in the domestic routine, the separation of sexes, castes and occupations; of the custom of sleeping and relaxation brought about by climate.*[105]

The housing in Chandigarh is designed as a single-family dwelling as opposed to a multi-family (extended family) unit. This is understandable for government housing that was rented on tenure, assuming only the person on the government payroll and his immediate family, would be moving in. Census and survey statistics show that there are more single-families in Chandigarh than extended families, thus validating the original program.[106]

Housing is mostly in rows with common party-walls, thus eliminating the problem of refuse filled alleys. The Type 14 housing for peons is different, being group-housing clustered to form 'villages' with a park or square in the center (Plate 5.1). Designed by Jane Drew, each house has an area of 450sq ft. with a two room layout instead of the traditional single space layout and a separate kitchen, bath and W.C. This design defined the "minimum dwelling" for the city. Unfortunately, there was still a segment of population that could not afford this minimum dwelling and were left to occupy squatter settlements on the fringes of the city.

Overall, the government housing in Chandigarh is a blend of Indian and western styles of living. There were new features, predominantly Western in nature, which were added, and combined with the traditional ones. One of the new features was replacing cooking on the floor with cooking on a counter, thus providing a western style kitchen without the quintessential Indian *chullah* (clay or wood-fire oven).

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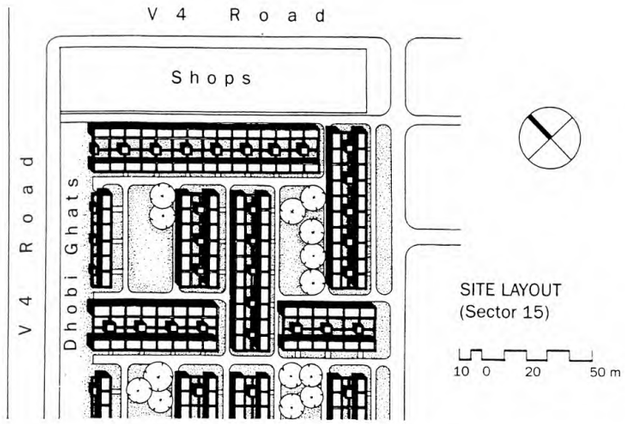
[105] Fry, *Chandigarh: The Capital of Punjab.*, p.90.

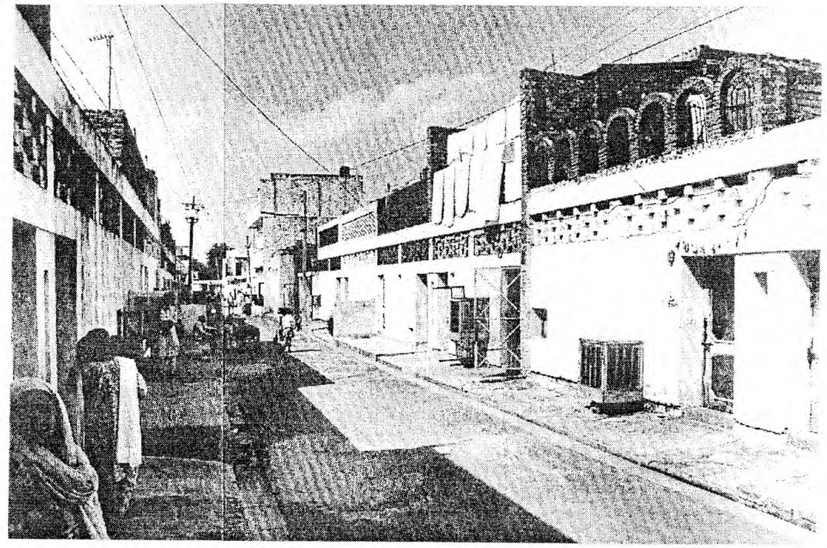
[106] According to a survey by Victor D'Souza in 1961, only 4.1 per cent of the population of Chandigarh was made up of joint families. Single person households were estimated at 29.8 per cent and single-family households formed the majority with 66 per cent.
D'Souza, p.47.

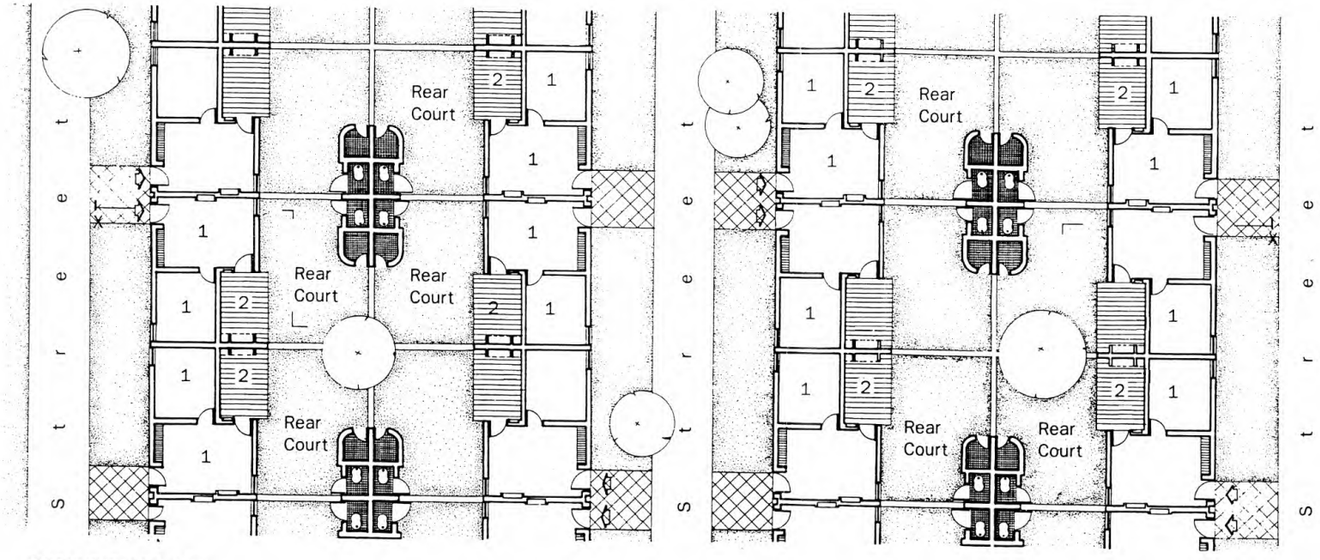


SITE LAYOUT
(Sector 15)

10 0 20 50 m

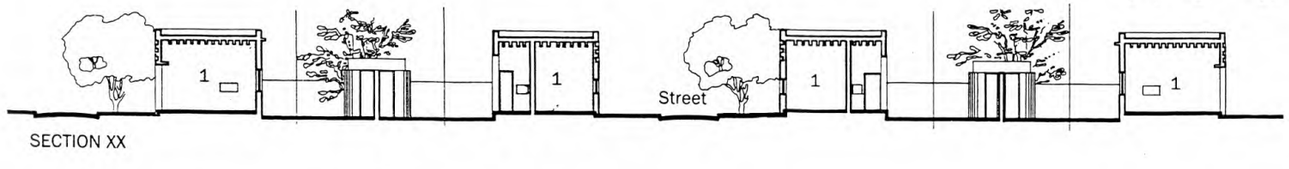
1 Room
2 Cooking Verandah





GROUND FLOOR PLAN

1 0 2 5m



SECTION XX

Plate 5.1 Type 14 housing in Chandigarh.

House Type 14-D
Sector 22, Chandigarh

Plot Size: 23'-0" X 34'-6"	Total Plot Area: 793.50 Sq. Ft.
Ground Coverage: 339.70 Sq. Ft.	Total Covered Area: 339.70 Sq. Ft.
Percentage Ground Coverage: 43%	Floor Space Index: 0.43
No. of Floors: 1	

Though the team spent time learning about the culture and habits of the local people, an overall understanding of the structure of traditional Indian housing was lacking. Individual elements such as *jaalis, chajjahs* and *jharokhas* were adopted but the morphology and structure of traditional housing were ignored. Maxwell Fry realized this shortcoming and remarked:

> *House design and sector layouts should have been considered as one but there was not enough houses of one type to enable us to design complete districts of our own type houses. Inevitably there was a mixing of interests and only an approximation to a comprehensive design was achieved*"[107]

Contrary to this, one may argue that Chandigarh was never meant to be a traditional city as is reflected in the ideas of the national policy makers.

Private Housing

The growth of private housing in Chandigarh was relatively slow when compared to government housing. In the first five years of construction, most of the housing activity was by the government. In the first few years, around 7500 plots had been sold to private individuals but even at the end of 1955, only 200 private houses had been constructed, as compared to 3600 government houses. It was found that 70 per cent of the people with plots were unable to build due to a lack of funds and 13 per due to a shortage of building materials such as brick and cement.[108] To boost construction, the government started providing a variety of incentives to plot owners, while laying out infrastructure facilities like roads, water and power supply, on the building sites. Despite

[107] Fry, E. Maxwell. (1961). *Problems of Chandigarh Architecture.* In *Marg*, Dec.1961, Vol.15, No.1, p.21.

the incentives provided, building activity in Chandigarh did not pick up. It was found that at the end of 1964, only 4075 of the 10,497 residential plots sold had been built upon.[109] Building activity in Chandigarh gained momentum in 1975, when an internal emergency was declared in the country and building materials were made easily available. Since then development in Chandigarh has progressed steadily.

Private housing in Chandigarh is on individual units called plots, demarcated by the Capital Project Organization (CPO). The government provided the plots with basic infrastructure facilities and sold them on a freehold basis to interested parties. Construction on plots is regulated by strict bye-laws and architectural controls. The fragmentation of any plot is strictly prohibited. To prevent overcrowding, a maximum of two dwelling units was permitted on each plot in the first phase sectors. Use of the third floor as a dwelling unit was discouraged by not allowing any services on the third floor. Unity and harmony in the facades of smaller plots (10 *marlas* or less), is achieved by the use of frame controls, which require a mandatory frame to be built, beyond which no construction is allowed. For bigger size plots, there are mandatory setbacks defining building lines. Within the permissible building area, the layout is up to the individual plot owner. Even the smallest of houses in Chandigarh have setbacks on the front and rear, for daylight and cross-ventilation, while providing open spaces for family activities. The smaller size plots have more floors and thus a higher density when compared to larger plots.[110] Though, most houses on smaller plots lack design innovations compared to those on bigger size plots that permit more versatility in design, it is the smaller houses that

[108] *Sharma, Sethi, et al.*, p.70.
[109] *Ibid.*, p.73.
[110] *D'Souza*, p.141.

resemble traditional social patterns more closely than rows of detached houses (Figs. 5.51 &52) set amidst sprawling lawns.

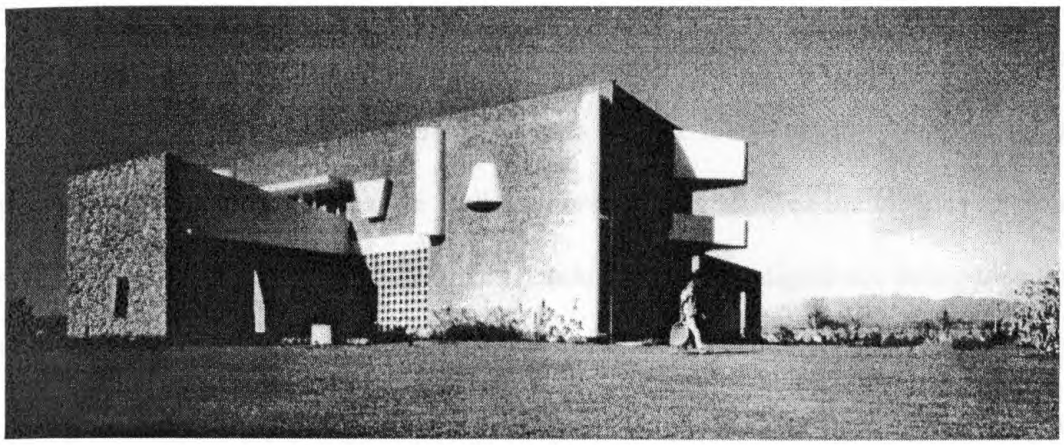


Fig. 5.51 A private house designed by Pierre Jeanneret, a detached house within a sprawling lawn.

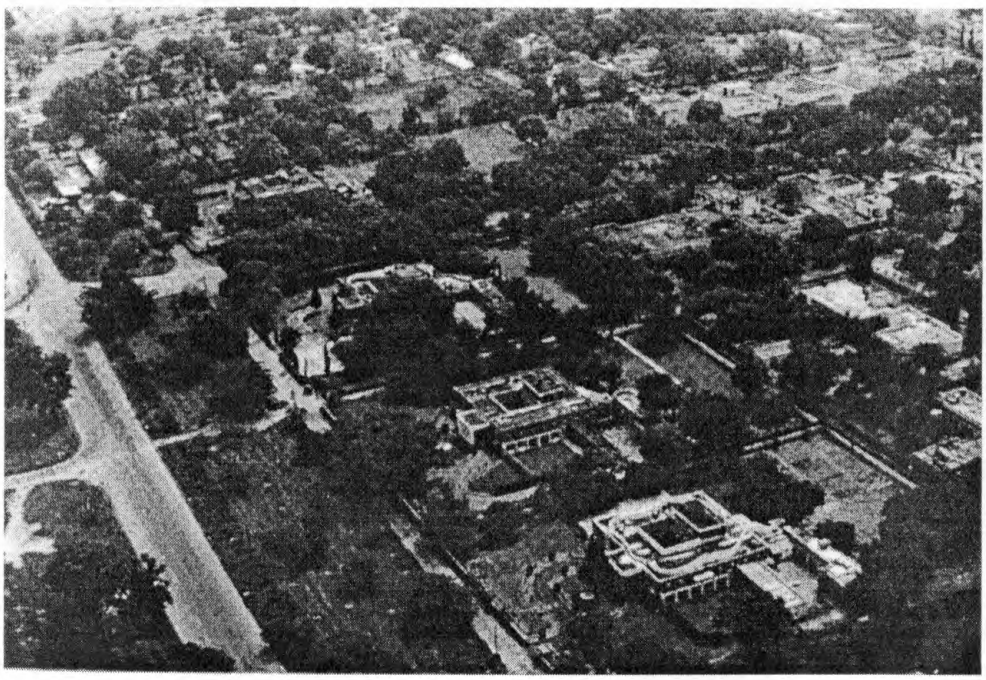


Fig. 5.52 An aerial view of detached houses on larger size plots.

With time, Chandigarh has become an important educational, cultural and industrial center of the region, attracting more people into it. With the rise of industry and trade, more wealth has flowed into the city, raising the living standard of the population. This has in many cases, led to an ostentatious show of wealth on the part of the private house owner. This has resulted in private houses that are following the pattern that was earlier more prominent in cities like Delhi, where the rich adorned the facades of their houses with costly marble and stucco. Old residences in Chandigarh are being torn down and replaced by palatial mansions with garish facades, in what Gautam Bhatia describes as "Punjabi Baroque". The characteristic features of such houses (Figs. 5.53 & 54) are the elaborate use of stone on the façade, the use of false columns, pediments and other Classical architectural elements to produce a pseudo-Classical, pseudo-Georgian or pseudo-Colonial style.

Fig. 5.53 A house built in the 'Spanish hacienda' style.

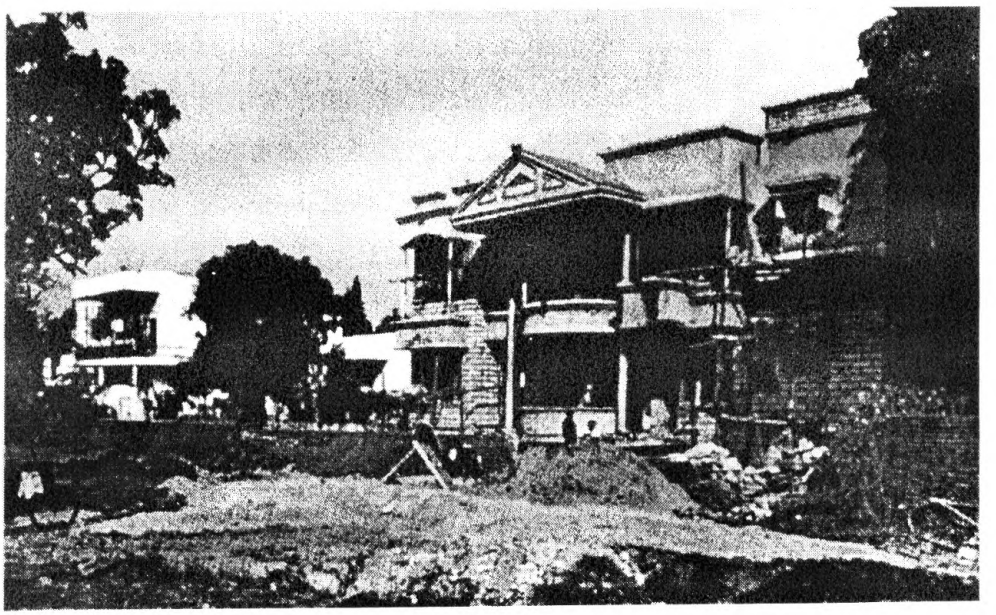


Fig. 5.54 Houses in pseudo-Classical style are becoming popular with the rich in Chandigarh.

The city seem to be changing to cater to the taste of the present day average Indian, who thinks, lives and breathes pseudo-Western culture. Such a degeneration of architectural standards is having an adverse affect on the original character of the city, where the works of architects like Le Corbusier, Pierre Jeanneret, Maxwell Fry and Jane Drew, may soon stand as isolated monuments.

SECTION 6

STUDY OF TRADITIONAL NORTH INDIAN CITIES

A study of the domestic architecture of the past serves to restore to the field some of its lost, human qualities which can provide valuable insights for the creation of a better, modern architecture. And, in largely tradition-bound society like the Indian, the need is even more imperative if one is to design a habitat which is in harmony with this reality.

- *V.S. Pramar.*[111]

[111] Pramar, V.S. (1989). *Haveli.* Ahmedabad: Mapin Publishing Pvt. Ltd. P.11.

CHAPTER 6.1

THE TRADITIONAL NORTH INDIAN CITY

In order to evaluate the design of Chandigarh in the regional context, it is important to understand the form and structure or the 'morphostructure'[112] of traditional[113] Indian cities in the north. In India, urban life is tied to deep-rooted traditions that are still a part of society. The form of Indian cities has always been generated out of these traditions and forces such as site, topography, climate, technology and resources. The elements of the traditional Indian city were evolved and perfected over several centuries. This evolution has resulted from the amalgamation of indigenous elements with those adapted from various foreign rulers, such as the Aryans, Mughals and the British.

For the purpose of forming a comparison of Chandigarh with traditional North Indian cities, two cities in close proximity to Chandigarh (Fig. 6.1) have been selected. The cities selected are: the walled city of Jaipur (about 350 miles south-west of Chandigarh) and Shahjahanbad, the old walled city of Delhi, the capital of India (about 150 miles south of Chandigarh).

[112] 'Morphostructure' is a term used by Kulbhushan Jain to describe the 'Form' and 'Structure' of Indian cities. According to Jain, "City form is an ordered arrangement of elements like sectors, streets, spaces, built forms, etc. in an order which responds to these forces (site, topography, climate, level of technological development, available resources and cultural pattern)...Structuring is the manner in which the components parts of a complex whole are arranged and inter-related to make an entity...It is the actual fabric of built forms, open spaces and streets resulting from human effort to resolve natural and social forces to create a suitable environment for habitaion."
Jain, Kulbhushan. (1978). *Morphostructure of a Planned City Jaipur, India.* In Architecture+Urbanism. August 1978, No.95. Pp.107-120. P.107.

[113] Amos Rapoport describes the term traditional to mean the model generated as "the result of the collaboration of many people over many generations as well as the collaboration between makers and users of buildings and other artifacts."
Rapoport, Amos. (1969). *House Form and Culture.* Englewood Cliffs, N.J.: Prentice-Hall, Inc. P.6.

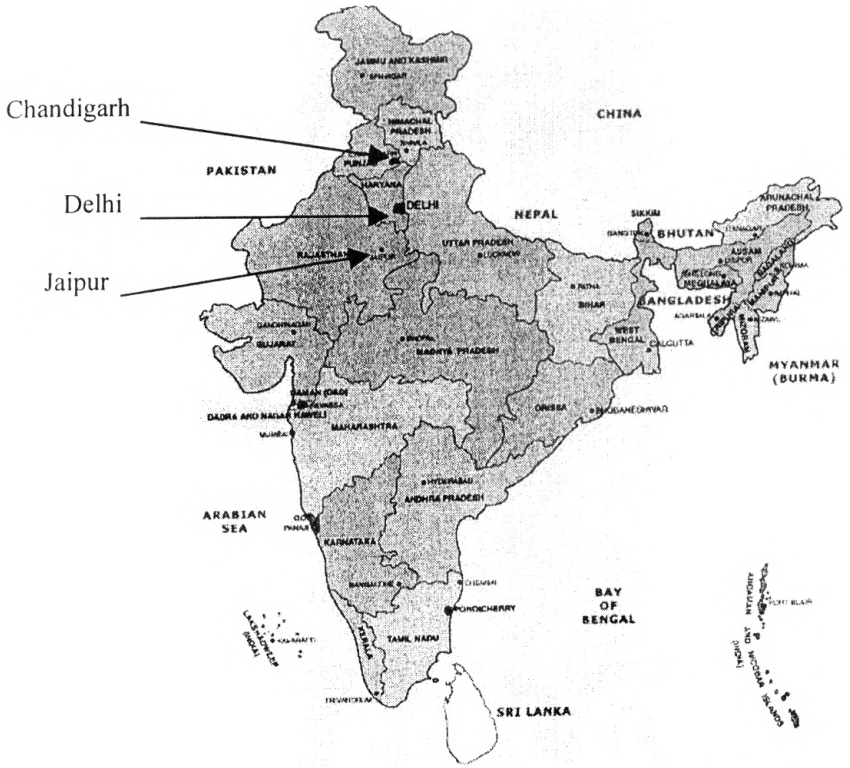


Fig. 6.1 Map of India showing the location of Chandigarh, New Delhi and Jaipur.

To understand a traditional Indian city it is necessary to describe the vernacular terms that are used to describe the urban and architectural typologies. A glossary of vernacular terms thus follows.

GLOSSARY OF VERNACULAR TERMS

Gali or Kucha

A *gali* or *kucha* refers to a linear street (Fig. 6.2). Most of these streets have mixed activities and mixed traffic passing through them. To this day most old cities have a multitude of such narrow streets where pedestrians and vehicles are mixed. Most streets

in Indian cities are more than just routes, they are centers of commercial and communal activities. There are basically three categories of streets: Primary, Secondary and Tertiary[114] (Fig. 6.3).

Fig. 6.2 A *gali* or *kucha* is a linear street with a mix of residential and commercial spaces.

[114] *Jain, Kulbhushan*, p.116.

Fig. 6.3 The Plan of a typical sector or *chowkri* in Jaipur showing the *mohallas* and the hierarchy of streets.

Primary Streets are the main commercial streets of the city, with vibrant images presented by the buildings and activities abutting them. Most of these buildings are ornate in character with elaborate surface decoration, embellishment or carvings. Design elements such as canopies, overhangs on carved brackets, projecting balconies, latticed screens, ornate doorways, add to the character of the street façade. Occasionally, a turning or a junction of streets, is marked by widening the street to form a public open space called a *chowk.*

Secondary streets are narrower and branch off from the primary streets. They are also commercial in nature but are marked by trade of a specialized nature.

Tertiary streets are local interior streets. They are even narrower than the secondary streets and are irregular in layout. Bordered by two or three storied buildings on both sides these narrow streets thus form shaded walkways for pedestrians. They are mostly residential in nature. Most of these streets are introverted and have a strong communal character.

Katra

Katra is a market with residential quarters and storage facilities. In old cities, a *katra* was originally enclosed by a wall and the entrance was marked by gates.[115]

Mohalla

A *mohalla* is a mixed land-use block in a city. A *mohalla* is generally developed along a spine street, with no rigidly refined boundaries. A ***mohalla*** is essentially made up

[115] Fonseca, Rory. (1971). *The Walled City of Old Delhi.* In *Existics*, Jan. 1971, No.182, p 74.

of *galis* and *katras* with both residential and commercial activities. Traditionally each *mohalla* (Fig. 6.3) was distinguished by the occupation, trade, religion, caste or geographical origin of the majority of its dwellers. But today, such a grouping has become weaker and *mohallas* now have a mixed population, marked more by the economic status than by occupation, trade, caste or religion. A *mohalla* is essentially an inward looking, self-contained neighborhood unit where daily use facilities are provided within the block.

Chowk

A *chowk* is formed by the widening of the street at the intersection of two or more streets or at the termination of an important street. It forms a communal space, somewhat like a piazza where people gather and socialize. In most old cities in India, *chowks* are still important social spaces. They are filled with hawkers and vendors displaying their wares and foodstuff on the street or being peddled from carts. A *chowk* is an active and lively space, particularly in the evening after work when people gather to socialize by sharing a cup of tea with others in the street. In many instances, *chowks* have a religious shrine too. Thus, their role as active nodes of social interaction is considerable. In the city of Jaipur, the term *chowk* is replaced by the indigenous term *chaupar*.

Haveli

Haveli is a multi-storied dwelling (Fig. 6.4 & 6.5) that is used for both residential and commercial purposes. The side facing the street generally has the shops with the associated workshops and stores. The rear and upper stories are primarily residential

quarters. A *haveli* is generally large enough to house an extended family. The extended family system is still extensively prevalent in India.

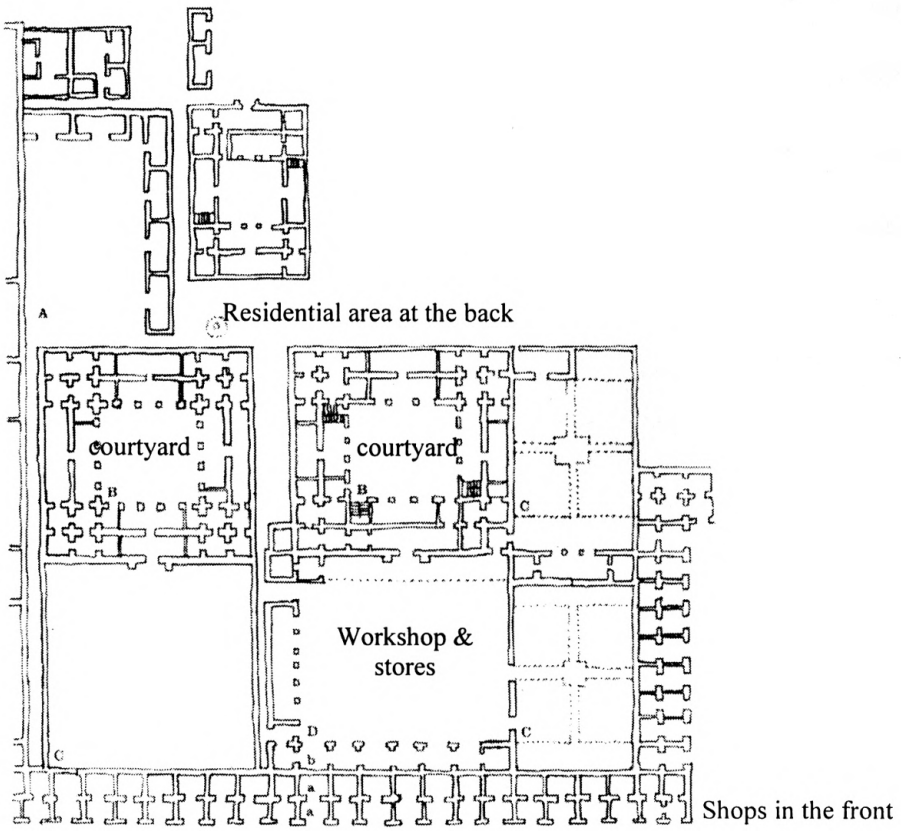


Fig. 6.4 Plan of a typical *haveli*

A *haveli* is basically inward looking with internal courtyards that form the private open spaces. The courtyard traps the cold air in the night, ameliorating it in the daytime. The courtyard is the scene of most family activities in the *haveli*. It is used for washing and drying of clothes, for eating, lounging and playing. The courtyard type open spaces did not evolve as mandatory spaces, rather they were a response to the need for private open spaces in the Indian society where privacy is highly valued. The amount of open

space is now regulated by bye-laws. In most cities in north India, roughly 65 per cent of ground coverage is permitted.

Usually there are no specific bye-laws controlling the façade of the *havelis*. Thus, *havelis* have diverse facades. Most *havelis* are richly decorated and embellished with motifs in regional style. The amount of surface adornment reflected the social status of the owner. Thus, the wealthy had more ornate *havelis* than the poorer sections of society.

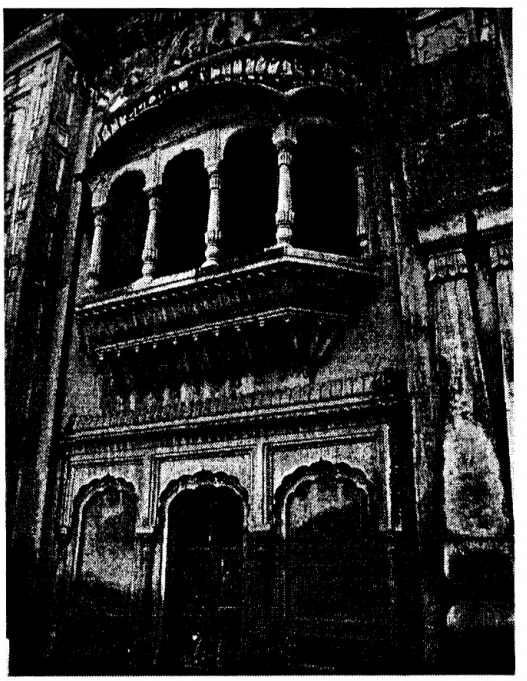


Fig. 6.5 The façade of a *haveli* in Punjab

Chatta

According to Fonseca, c*hatta* refers to the upper story (Fig. 6.6) of a residential structure that crosses over a *gali* or *kucha.*[116] It is provided to produce additional living space. It also provides shade to the street. Such a construction over a street is no longer permitted. *Chatta* is also used to describe a sleeping terrace (Fig. 6.7) on the roof of a house.

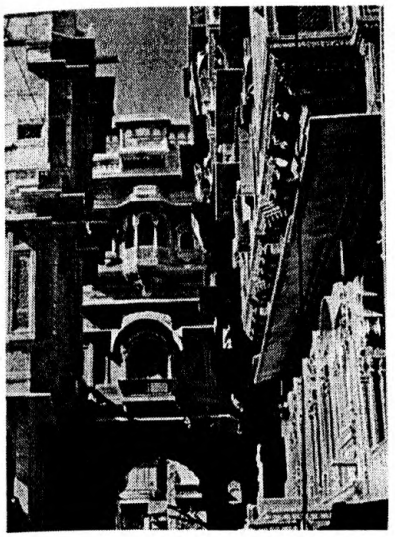


Fig. 6.6 A *Chatta*, the upper story of a residential structure that crosses over a street, in Jaiselmer .

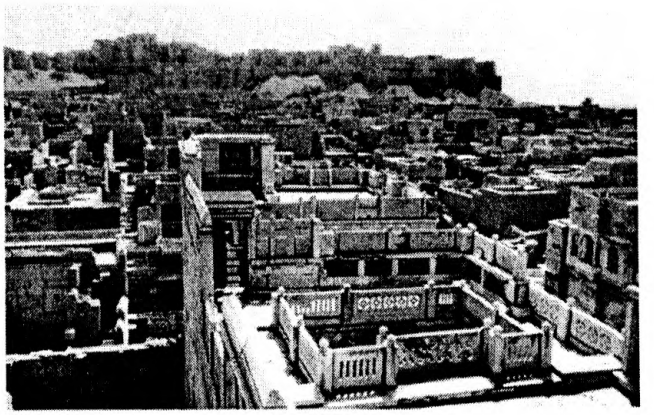


Fig. 6.7 A *Chatta* , the terrace of a house, in Jodhpur.

Deori

Deori is the entrance (Fig. 6.8) to a *haveli*. It is usually a covered platform, leading directly to the street. The *doeri* forms a major community space where people sit and interact with their neighbors and passers-by. It forms a transition space between the street, which is public in nature, to the house, which is private.

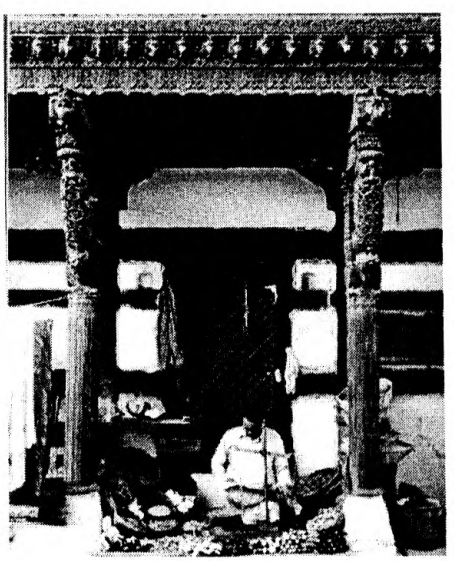


Fig. 6.8 A *deori,* forming the entrance to a *haveli* in Gujarat.

[116] *Fonseca*, p.74.

Verandah

Verandahs are private open spaces (Fig. 6.9) that are generally provided in front of a room as an extension for outdoor activity. They are generally open on three sides and covered by a roof to protect them from sun and rain. *Verandahs* also protect the family rooms from direct sunlight and heat thus ensuring comfortable interiors.

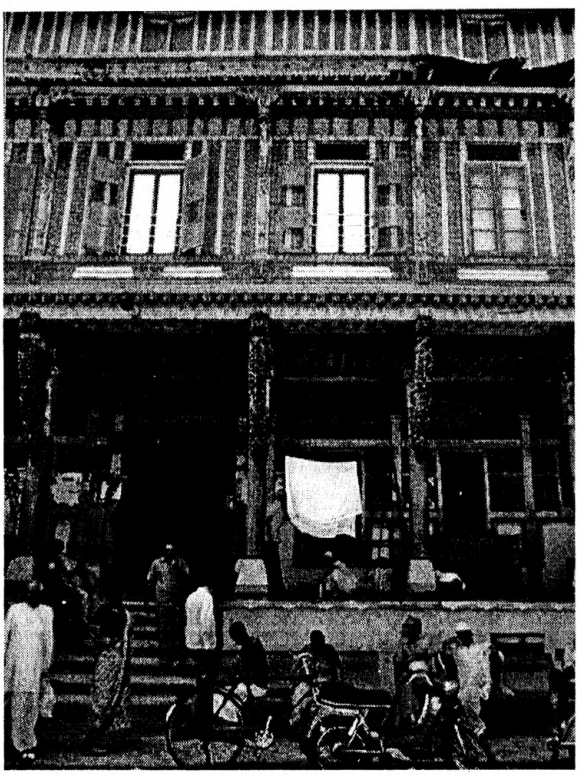


Fig. 6.9 An example of a porch in Gujarat.
The porch of the house is often called the *verandah* (in addition to the private courts).

Bazaar

Bazaar (Fig. 6.10) is the term used for the shopping and commercial streets of the city. Bazaars could be on any kind of street: primary, secondary or tertiary.

Fig. 6.10 Examples of *bazaars* (Delhi and Jaipur). One on a primary street and the other in a tertiary street.

Jaali

A jaali is a perforated screen (Fig. 6.11) carved in stone or made of bricks. It was traditionally used to screen the women of the household from view or contact with other men. The *jaalis* also block out the harsh rays of the sun while permitting air to circulate.

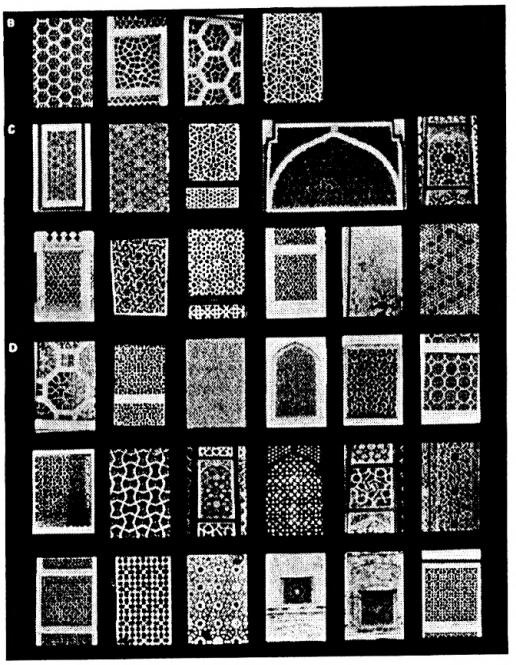


Fig. 6.11 Patterns of traditional *jaalis* in stone.

Chajjah

Chajjahs are overhangs (Fig. 6.12) that shade the windows and doors from the sun and rain. Sometimes projected balconies or *jharokhas* were used to serve as *chajjahs* instead of providing separate ones.

Jhaorokha

Jharokha is a balcony/ projection (Fig. 6.13) overlooking the street. It is generally enclosed by perforated screens or *jaalis* on the sides facing the street. A *jharokha* was originally designed to serve as a viewing gallery for women, at a time when they did not have much freedom to go out unescorted.

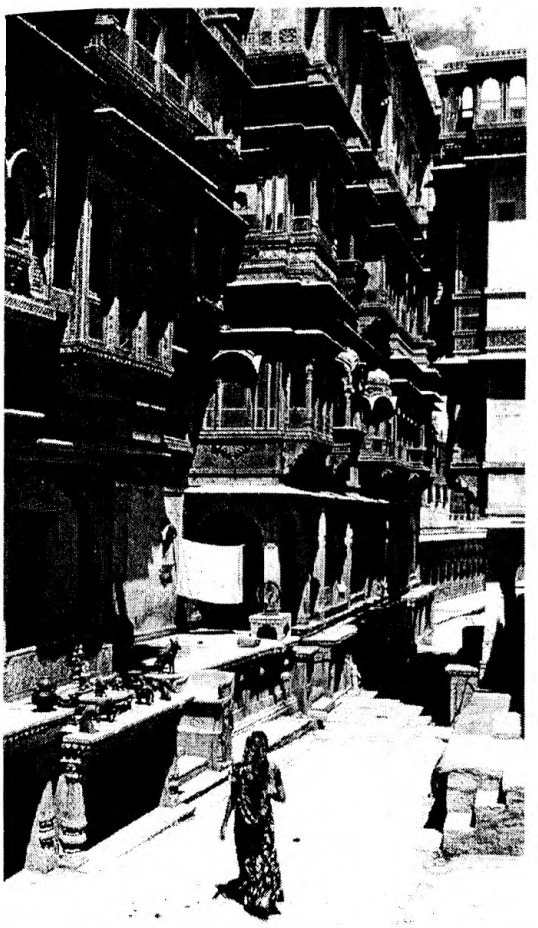


Fig. 6.12 A *haveli,* in Jaiselmer.

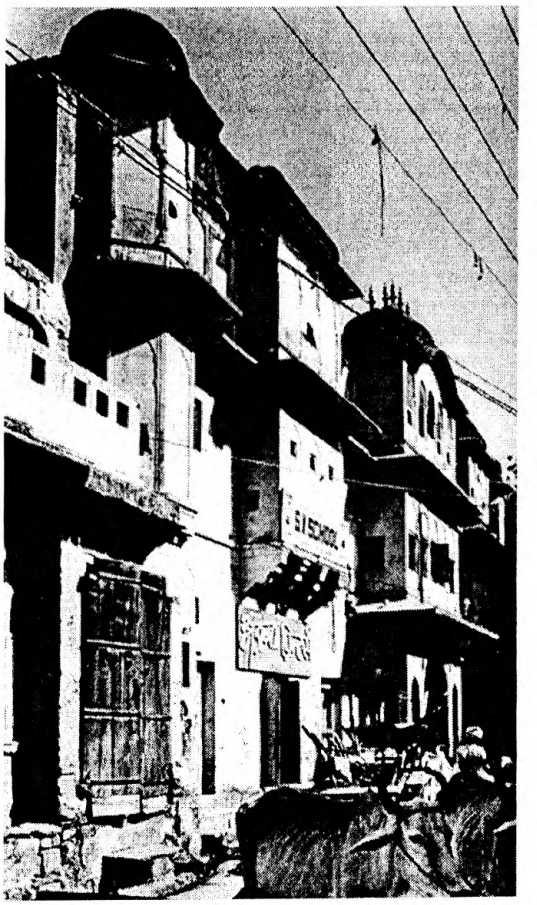


Fig. 6.13 *Jharokhas,* enclosed balconies looking onto a street in Jaipur.

Barsati

Barsati (Fig. 6.14) is a structure on the roof terrace (*chatta*) that is used to cover the staircase leading up to the terrace. It generally consists of a room for storing the *charpoys* (woven cots or beds) and other items such as mattresses and sheets necessary for sleeping on the terrace.

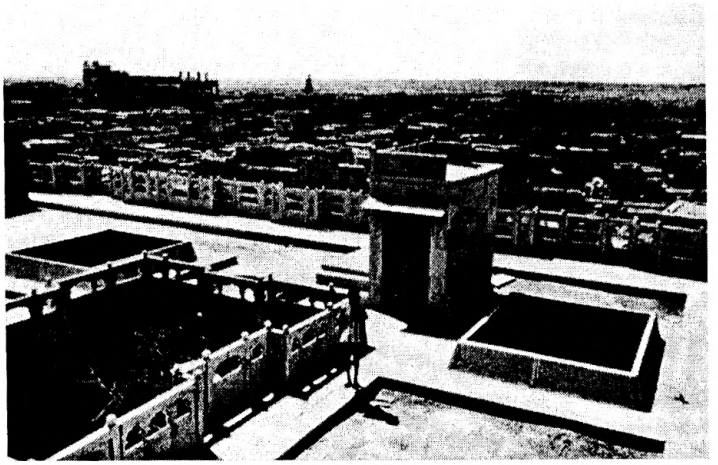


Fig. 6.14 A *Barsati,* room on the *chatta* to store beds for sleeping on the terrace, in a *haveli* in Rajaasthan.

OVERVIEW

Contemporary Indian society and its way of life are still deeply rooted in traditions. Indian cities, like traditional cities around the world, are a "direct translation of physical, social and cultural needs and values into physical built form."[117] Of these, the physical factors are the particularities of the site and its topography, the climate and the natural vegetation and the technological and material resources available. The social and cultural factors, intertwined with religious and economic factors also manifest themselves in the built form of the cities.[118] A short description of these factors follows.

Topography and Climate

In the North Indian plains (where Chandigarh is located) the topography is generally flat with occasional hill outcrops. The climate is one of extremes. The year can

[117] Watts, Donald J. (1981). *Recurrent Patterns in Traditional Afghan Settlements.* Afghanistan Journal, Vol.8, No.2 (First Quarter, 1981). P. 66.

[118] Amos Rapoport identifies several factors as determinants of vernacular house forms. They are: Climate and Need for Shelter; Materials, Construction and Technology; Site; Defense; Economics; Religion and Socio-cultural factors.
Rapoport, p.ix.

be divided into four seasons. The winter season extends from November to March when the average temperature is in or below the mid-twenties (degrees centigrade). The winter season is followed by a summer season from April to June. The summers are hot and harsh with average temperature being in the high thirties and forties (degrees centigrade). Night temperatures are relatively lower and there is a slight breeze. The period from July to middle of September constitutes the southwest monsoon season when the temperatures drop to the thirties and the humidity is very high (between 42-72 per cent). There are frequent spells of rains and storms. The last season is the post-monsoon period extending from the latter half of September to the end of October, which has lower temperatures and some rain.[119] In general, summer is the harshest season and most of the features of Indian architecture have evolved out of a need for protection from the sun and heat.

Social and Cultural factors

Indian society is complex and diverse. There is a constant dialectic between community living on one hand and a strong differentiation and hierarchy, based on the caste system, on the other. This complexity is a result of indigenous social, religious and philosophical factors and foreign influences. There has been a semblance of continuity because the new forces did not totally displace the old, but led to additions and adaptations. Cultural continuity is clearly seen in the, almost unchanged, existence of the old walled cities of Shahjahanabad and Jaipur. Within the social and cultural factors important in determining the character of traditional Indian cities, it is important to

[119] Indian Meteorological Department, Government of India. (1991). *Climate of Haryana and the Union Territories of Delhi and Chandigarh.* New Delhi: Controller of Publications.

discuss the influence of the caste system and the family structure, particular to the Indian context.

- **Caste System**

Since Aryan times, Indian society has been characterized by the caste system. Originally the caste system was a stratification of the society based on the division of labor. With time it became associated with social status based on the Hindu value system. The caste system originally derived out of the Vedic concept of *varna* or caste. According to this system, people were classified under four *varnas* in this particular order: *Brahmin*, *Kshatriya*, *Vaishya* and *Shudra*. There was a fifth category that consisted of the untouchables called *Harijans*. They were the lowest caste of people who were usually segregated and not even considered to be worthy of being included in the *varnas*. Any contact with the *harijans* was considered profane for members of the other four *varnas*.

The *Brahmins* were the priestly class, and commanded the highest respect in the society. Next were the *Kshatriyas* who were the warriors. The *Vaishyas* were the business community and the *Shudras* were people with menial jobs like sweeping and cleaning. The *Brahmins* and *Kshatriyas* were the higher castes and the other two were considered to be the lower castes. Initially based on trade, this classification became like a family name that lingered for generations, in spite of changes in occupation. The hierarchy became very rigid and inter-caste mixing was considered a social taboo. There was strong discrimination on the basis of caste in every field of life. With time it became less rigid as people became more accommodating to differences in caste. M.N. Srinivas suggests two

factors that affected changes in the caste system. These are: 'Sanskritization' and 'Westernization'.

According to Srinivas, Sanskritization refers to, "the process by which a "low" Hindu caste, or tribal or other group, changes its customs, ritual, ideology, and way of life in the direction of a high, and frequently, "twice-born" caste. Generally such changes are followed by a claim to a higher position in the caste hierarchy than that traditionally conceded to the claimant caste by the local community."[120] By 'Westernization', Srinivas refers to changes introduced in the Indian society as a result of the British rule. Westernization also corresponds to industrialization and urbanization in the modern society.

Both these influences are ongoing processes and continue to effect Indian society. Coupled with economic and political changes they have been responsible for transforming Indian society from blindly following the caste system to a more rational society judging individuals on personal merit rather than their caste. Other factors contributing to such a change are, increasing levels of education, a higher literacy rate, and changing philosophical beliefs that can be attributed to several social reform movements and compassionate leaders like Mahatma Gandhi.

The caste system has had considerable influence on the design of Indian cities. A traditional city was divided into zones and blocks consisting of people from the same caste. The prominent areas of the city, generally in the vicinity of the royal palace, were occupied by the higher castes. The lower castes were placed further away from the palace, whereas the untouchables were located outside the city limits. With time this division became less rigid with the intermixing of castes and the liberalization of society.

Nevertheless in some way Indian cities are still based on an order generated by other factors such as social, economic or religious status. Though the country is attempting to change such an order, progress in this direction is slow.

- **Family System**

Traditionally, the family unit in Indian society is the joint or extended family based on kinship. A joint family can be described as, "a group of people who generally live under one roof, who eat food cooked at one hearth, who hold property in common and who participate in common family worship and are related to each other as some particular kind of kindred."[121] A joint family is thus made up of a series of generations living together under one roof. The basis of such an arrangement was an affinity for collective life and economic factors. Increasing urbanization, changes in standards of living and the increasing cost of land and resources have affected the traditional family structure, leading to increasing instances of nuclear families. This is more common in urban areas where such pressures are more severe. Nevertheless, the dominant Indian family unit is still that of an extended family.

The most dominant social factors determining the morphostructure of Indian cities are- 'desire for proximity' and 'need for privacy'.[122]In India, people generally live in close-knit communities where families live together in a joint-family or extended family relationship. Interaction with neighbors is very frequent and an integral part of daily life. This desire for proximity is reflected in the closeness of dwellings in traditional Indian

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[120] Srinivas, M.N. (1966). *Social Change in Modern India.* Berkeley: University of California Press. P.6.
[121] Karve, Irawati. (1953). *Kinship Organization in India.* In *Deccan College Monograph Series 11.* Pune, India: Post-Graduate and Research Institute. P.10.
[122] *Jain, Kulbhushan.* p. 109.

cities. The dwellings are clustered together with common walls and easy accessibility to the neighboring houses through the terrace or from the front door. This clustering is reflected clearly in the figure/ground plans of a typical *mohalla* in both Jaipur and Delhi. While there is a definite clustering of dwellings and common communal spaces, there is also a strong sense of privacy. These dwelling clusters exclude views of private areas from the street. Elements such as *jaalis* and *jharokhas* reinforce this privacy. The internal courtyards form private open spaces used primarily for family activities. There is a hierarchy in open spaces, which can be categorized under private, semi-public and public spaces. The private open spaces are the internal courtyards; semi-public open spaces are the *verandahs* and *deori* in the front part of the house; the public open spaces are the streets and squares outside the house.

CONCLUSION

Most of the elements of a traditional Indian city respond to one of the several factors constituting the site, climate, economy, religion and the social and cultural needs of the people. The design elements have evolved over time and are still a part of the cultural context.

CHAPTER 6.2

JAIPUR: STUDY OF A TRADITIONAL INDIAN CITY

Jaipur, called the 'Pink City', is the capital of the north-western state of Rajasthan. It is located about 200 miles south of the national capital Delhi. The main reason for selecting Jaipur as a study of traditional North Indian City is that it is one of the few planned Indian cities that has survived in its original form despite the advent of machine age and the growth of population. It is also a useful case study because of its proximity to Chandigarh, which is only 350 miles to the north.

Jaipur was founded in 1727 by the Rajput Maharaja Sawai Jai Singh (1687-1743) to replace the existing hilltop city of Amer as his capital. The plan for the new city, designed by Vidhyadhar Bhattacharya, is based on ancient Hindu town planning principles laid down in the *silpasastras.*[123] In its geometry, the plan is based on the nine-square *mandala*[124], corresponding to the *navgraha* or house of the nine planets. The basic plan was distorted to make adjustments for the hill outcrop on the site. The plan (Fig.6.15) was a rational application of the *mandala* because it was adjusted to conform to the particularities of the site. The nine-square grid was rotated at angle of 15 degrees on the north-south axis to accommodate a natural ridge on the site.

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[123] The *silpasastras* are the ancient Hindu treatises on architecture and town planning which discussed planing in relation to the cosmos, the earth and the social order. The term *silpasastras* means technical treatises. The three main treatises on planning are the *Manasara,* the *Mayamata* and the *Samarangana Sutradhara.* The most important amongst these being the *Manasara* which describes eight types of villages and designates town as only being large villages.
For a detailed description of these treatises refer to: Dagnes, Bruno & Vatsayayan, Kapila (Eds.). (1984). *Mayamatam: Treatise of Housing, Architecture and Iconography.* New Delhi: Indira Gandhi National Center for the Arts.

[124] The term *mandala* in ancient Hindu treatises means a model of the cosmos. The Vastu-Purusha Mandala was one such model for architecture which was used to generate order in both secular and sacred buildings. Each *mandala* is perfect square which is further divided into identical squares forming a series starting from 1, 4, 9, 16, 25 and up to 1024.
Kagal, Carmen (Ed.). (1986). *Vistara. The Architecture of India.* Bombay: Festival of India. p. 36.

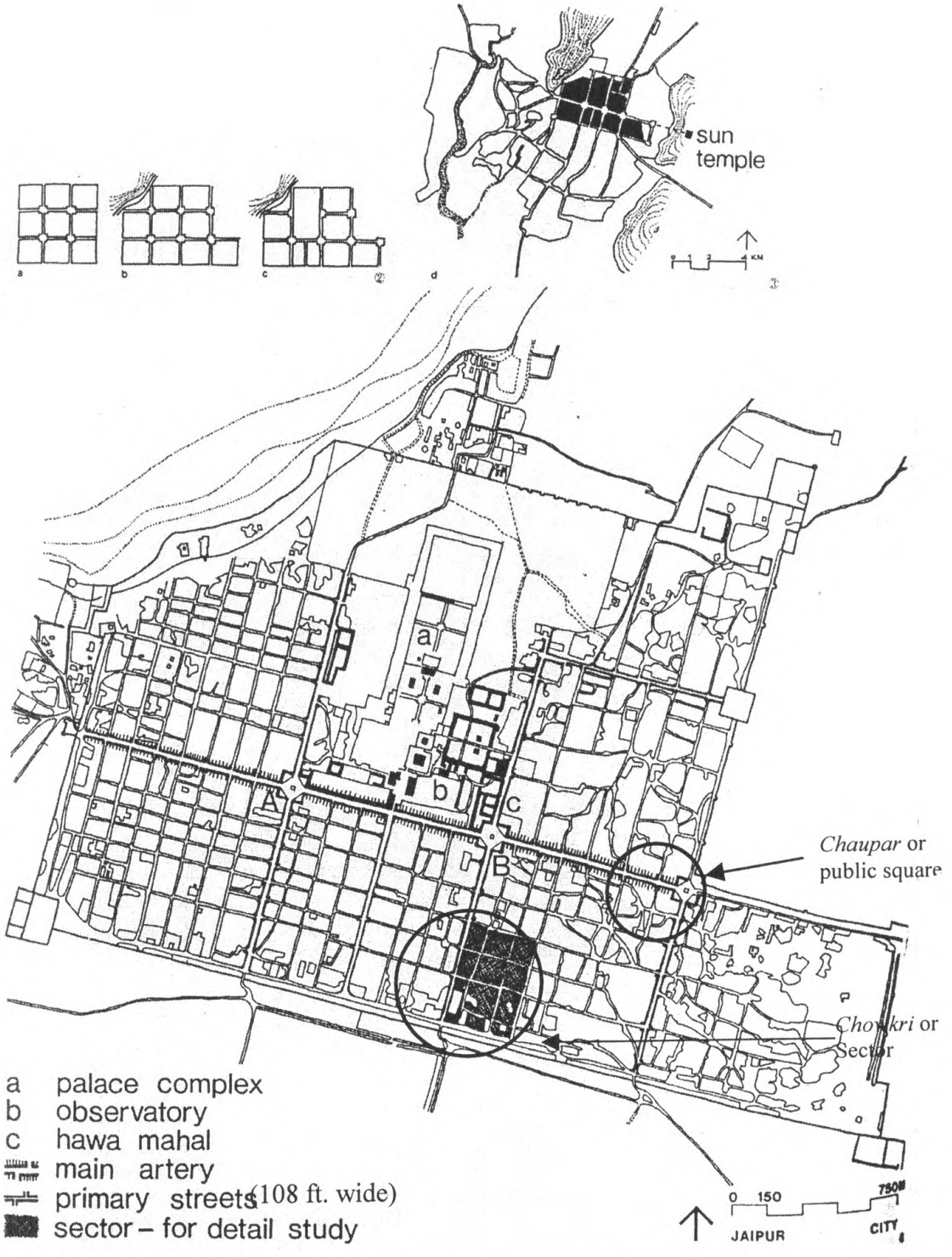

Fig. 6.15 Plan of the ancient city of Jaipur based on the nine squares of the *mandala*. The nine blocks are confined by a grid of perpendicular roads and an intricate network of internal streets.

The master plan of Jaipur is an attempt to combine the ancient sacred beliefs of Hinduism with the principles of science. This idea is reflected in the design of *Jantar Mantar,* the observatory built by Maharaja Jai Singh who was also a keen astronomer.

The plan of Jaipur consists of nine 850 meters wide squares[125] forming the principle blocks of the city (Fig.6.16). These blocks, separated by 33m wide main streets, are called c*howkris*[126]. The *chowkris* are further sub-divided into *mohallas* into which entire villages of 50-60 families were transplanted. The main streets or *bazaars* terminated at the city gates (Fig. 6.17). The intersection of two main streets is marked by 100m wide market squares (small piazzas) called *Chaupars*[127] (Fig. 6.18). The main axis in the city is formed by the east-west trading route called the Tripolia Bazaar. The central square, north of this route, was occupied by the Royal Palace, the ruler being symbolically placed at the center, the *axis mundi* of the town.

Though the grid of main roads, the primary and the secondary streets, bordering the *chowkri* and its *mohallas* was rigid (Fig. 6.19), the interior network of tertiary streets was relatively flexible. The predominant house-type within a *mohalla* is a *Haveli*[128]. A *haveli* (Fig. 6.20) is essentially a courtyard house that serves the dual function of being a commercial as well as a residential unit. The side facing the street has shops with the associated stores and workshops. The rear and the upper floors form the residential areas

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[125] Anderton, Frances. (1989). *Learning from Jaipur.* In *The Journal of Architectural Education.* Vol.42, No.4, Summer 1989. Pp. 15-24.
These blocks were actually not exact squares. They measured around 1.6 miles in the east-west direction and 1.3 miles in the north-south direction.
Refer to: Sealey, Neil E. (1982). *Planned Cities in India.* Occasional Papers V. University of London: Extramural Division, School of Oriental and African Studies. P. 10.

[126] *Chowkri* is a term used for a city block. Refer to: Roy, Ashim Kumar. (1978). *History of the Jaipur City.* New Delhi: Manohar Publications.

[127] The *Chaupar* is an indigenous Rajasthani term for a *Chowk.*

[128] A *haveli* is a multi-storied, mixed-used residential building that is generally structured around a series of courtyards. A *haveli* with its multitude if rooms was generally occupied by members of the same family and in a lot of incidences by the whole clan.

of the *haveli*. The *bazaars* and the *chaupars* form the main public spaces of the city. The *chaupars*, with their pools, fountains and resting-places are the hub of social activity. In Jaipur the *bazaars* are linear piazzas that link the monuments and have been kept intact by strict legislation controlling growth along them

Fig. 6.16 A figure-ground plan of a part of a *chowkri* or sector in Jaipur. There is a strong grid of secondary roads framing the sub-sector blocks but the network of tertiary internal roads is flexible in layout. The prominent open spaces are either *chaupars* (squares) or internal courtyards.

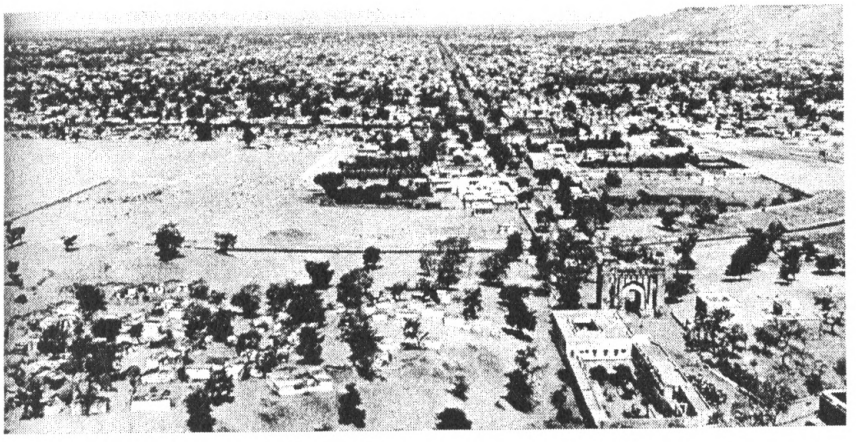


Fig. 6.17 A view of the city of Jaipur from the Sun Temple showing one of the major roads and its gateway.

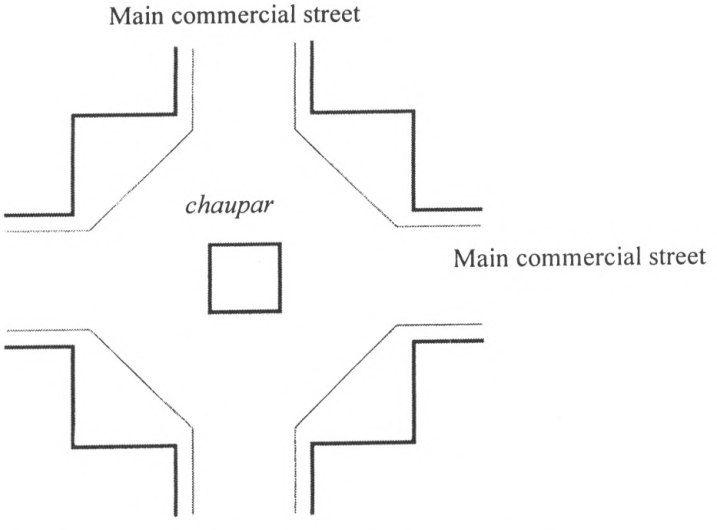


Fig. 6.18 The City Squares called *Chaupars* were formed by widening of the streets at the intersection.

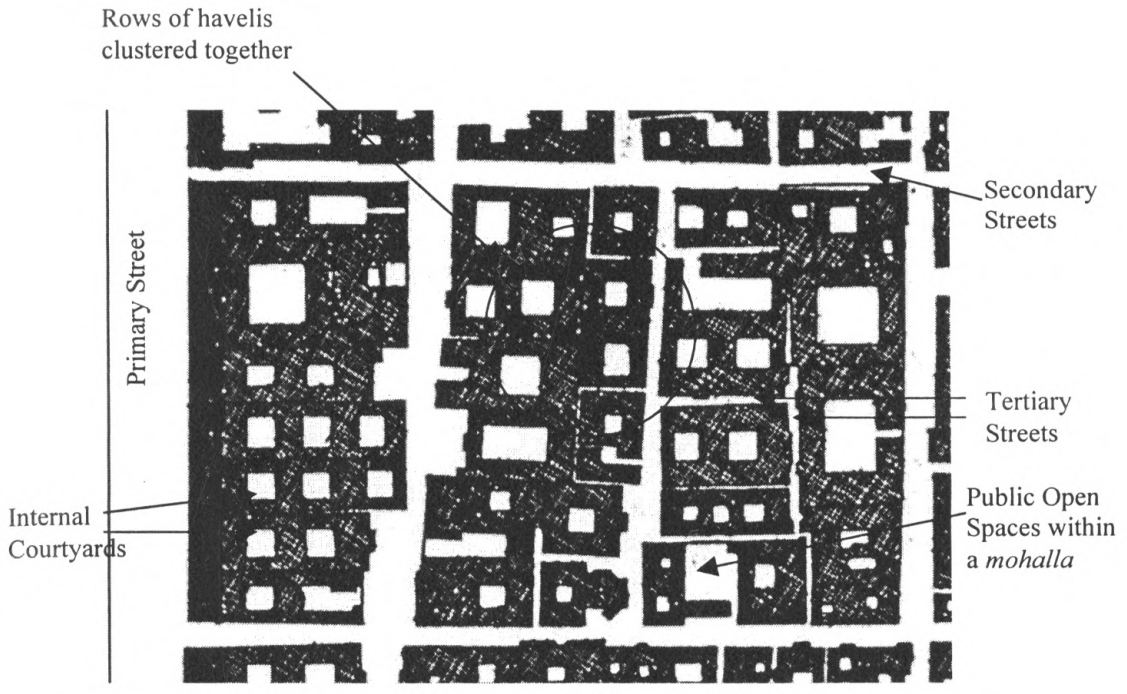


Fig. 6.19 A typical *mohalla* with primary, secondary and tertiary streets.

MORPHOSTRUCTURE OF JAIPUR

Chowkris (Blocks—Sectors)

Chowkris are blocks (Fig. 6.20) measuring around 850 meters along the east-west axis. According to Neil Sealey, this dimension is generated out of the ten minute walking time it takes to traverse this distance on foot.[129] The *chowkris* are bound by a grid of 108 feet (33m) wide roads. These roads form the *bazaars* or the linear piazzas of the city. Within the *chowkri* these roads branch out into a grid of 54 feet wide access roads that divide the block into sub-blocks called *mohallas*. The *mohallas* have an internal network of 27 feet wide lanes, which branch out into 13 feet wide narrow lanes called *rastas* or *galis*, which are flexible and supports changes necessitated by time. Some of these changes have been in the form of addition of an extra story, redesign of street façade and change in use.

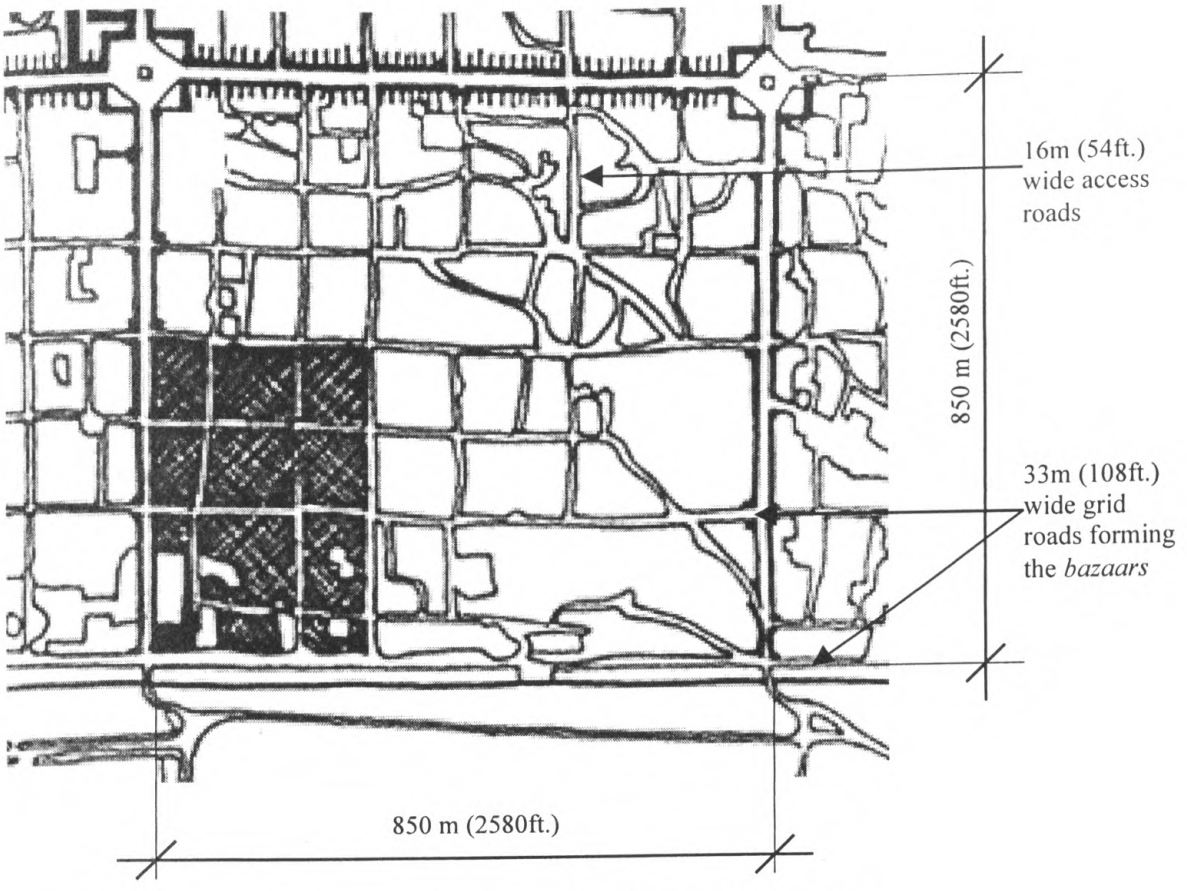


Fig. 6.20 A typical *chowkri* or block in Jaipur with a rigid grid of 850m x 850m.

Fig. 6.21 Street and Space Clusters of housing in the *mohallas.*

[129] *Sealey*, p.12.

Mohalla (Sub-Sector)

Typically, each *chowkri* is divided into approximately 40 *mohallas*, each *mohalla* (Fig. 6.22) being distinguished by the trade or caste of the majority of the population occupying it. A typical *mohalla* is made up of residential units called *havelis*. Land for these *havelis* was allotted on the basis of the caste and social status of the individual or family. The *mohallas* near the palace were inhabited by the higher caste and the noblemen and the lower castes were allotted plots near the city walls. This kind of a hierarchy, based on the caste system, is evident in most Indian cities of that time. The same pattern is seen even in Shahjahanabad, the old walled city of Delhi (which will be discussed in the next section). Today, such a distinction is less prominent and there exists a more uniform mix of population.

Like other cities in India, the city form of Jaipur was determined by the arrangement of these *mohallas.* Each *mohalla* is a dense mass of built area with a multitude of *galis*, *chowks* and clusters of *havelis* with their internal courtyards carved into the fabric. Most houses in Jaipur are grouped to form clusters. There are basically two kinds of clusters: the 'street cluster' and the 'space cluster'. [130] The street cluster has groups of houses along a linear street. In this case the street and elements of the *haveli* like the *deori,* with its entrance steps, become the social spaces of the community. In the space cluster the houses are built around an open square, which is connected to tertiary streets. These clusters form the fabric of the city (Fig. 6.21).

Haveli (Residential/Commercial units)

Havelis are inward looking houses structured around courtyards (Fig. 6.22). They are based on strong notions of both privacy and community living, which is so evident in the Indian way of life. Private courts, balconies and terraces form its core elements. The form and spaces generated by them are a result of both climatic and social needs. Central courtyards bring indirect light to the interiors of the house while serving as utilitarian spaces for the members of the household. Terraces, balconies and *jharokhas* supplement the courtyards as private open spaces (Fig. 6.23). The fabric of the city block is thus governed by these carved out open spaces which are organized in a definite hierarchy of public, semi-public and private spaces.

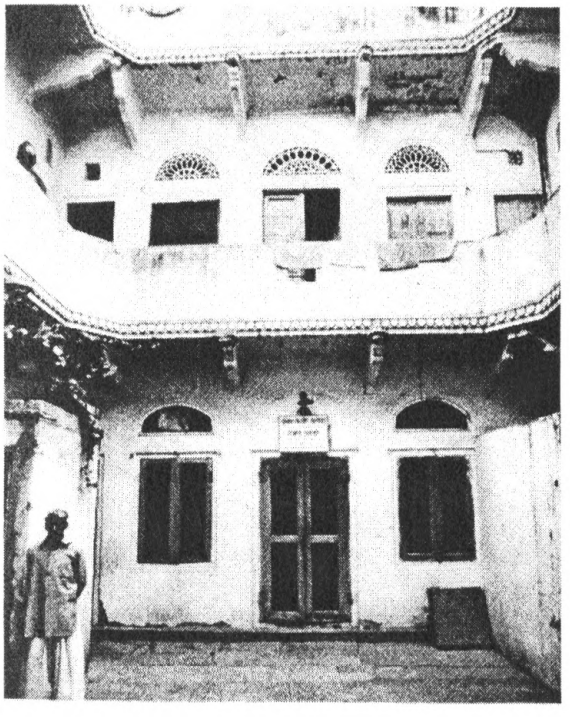
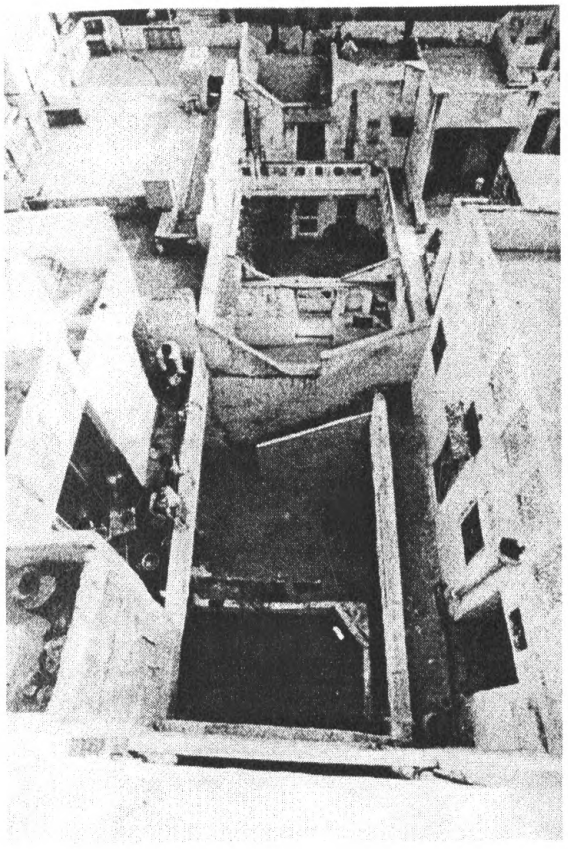


Fig. 6.22 A haveli with an internal courtyard which forms private open spaces that are used for activities like eating, sleeping, washing and playing.

[130] *Jain, Kulbhushan*, p.118.



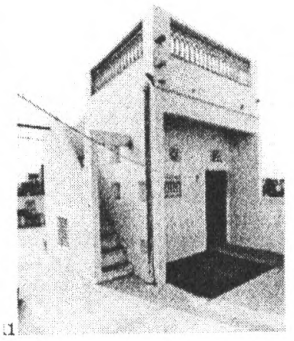


Fig. 6.23 Another form of private open spaces are terraces with *barsati* (right), that are generally used for sleeping in the summer. Most of the houses are interconnected permitting close interaction with the neighbors.

The ground floor of the *haveli* is usually reserved for commercial use and the upper floors were for residential use. The plan (Fig. 6.24) consists of a series of inward-looking rooms opening into galleries. These galleries then open into courtyards. Courtyards were generally two or three in number and were designed to cut off direct sunlight and to allow the passage of breeze. Status was expressed through size and the degree and quality of embellishment on the surface. Overall, the *haveli* is a flexible ordering of rooms as dictated by use and convenience.

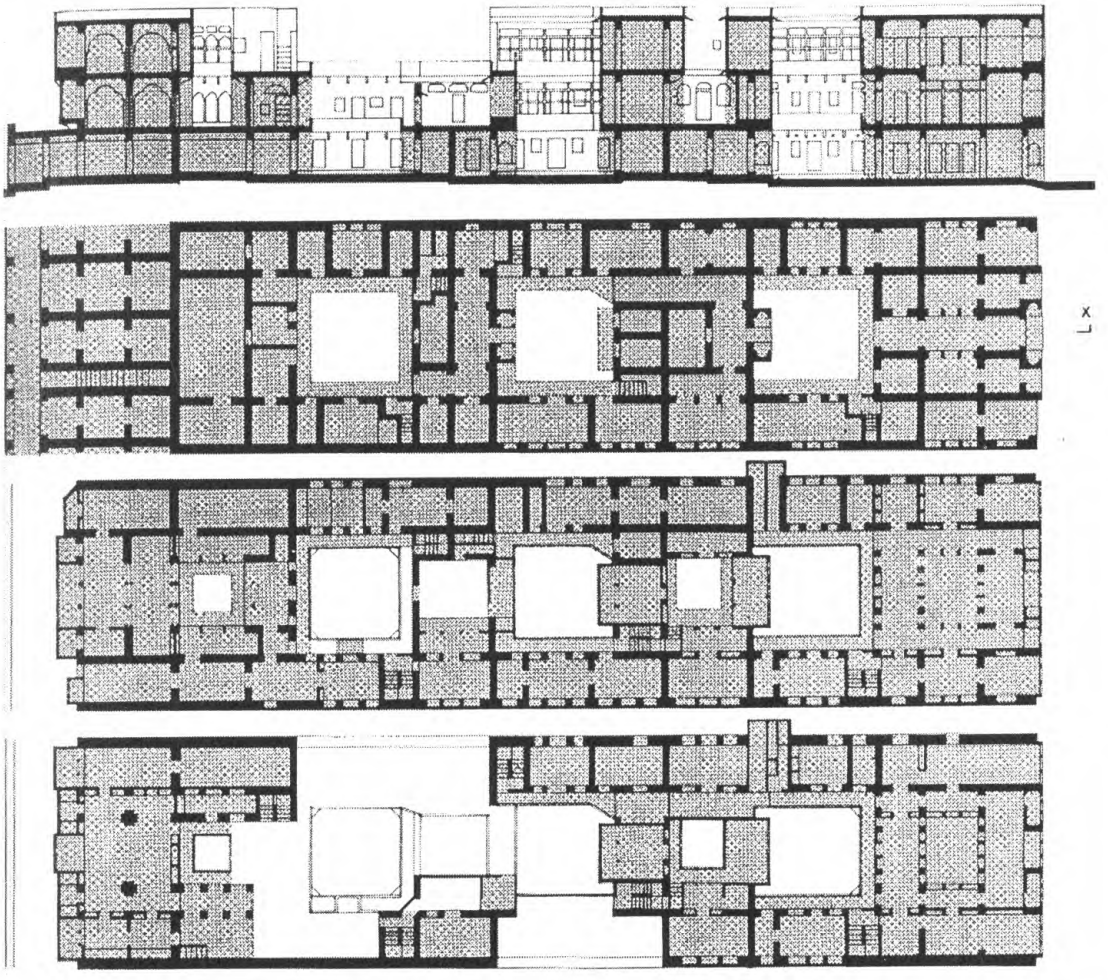


Fig. 6.24 Floor Plans and Section of a typical *haveli* in Jaipur. The *haveli*, generally two to three stories high, is based around a series of open courtyards that bring light into the interior rooms and serve as family spaces.

Bazaar (Street)

The *bazaar* street (Fig. 6.25 & 6.26) in Jaipur is the center of the commercial and recreational activities of the city. The 108 feet wide roadways had 25 per cent of this street width on either side as pavement for pedestrians. No houses are permitted to open on the *bazaar* street. The height of buildings on this street is restricted to half the street width. There were strict controls for the design of these shops to maintain a degree of

coherence in the façade design. In spite of the controls, there is still a variety in the façade treatment and design.

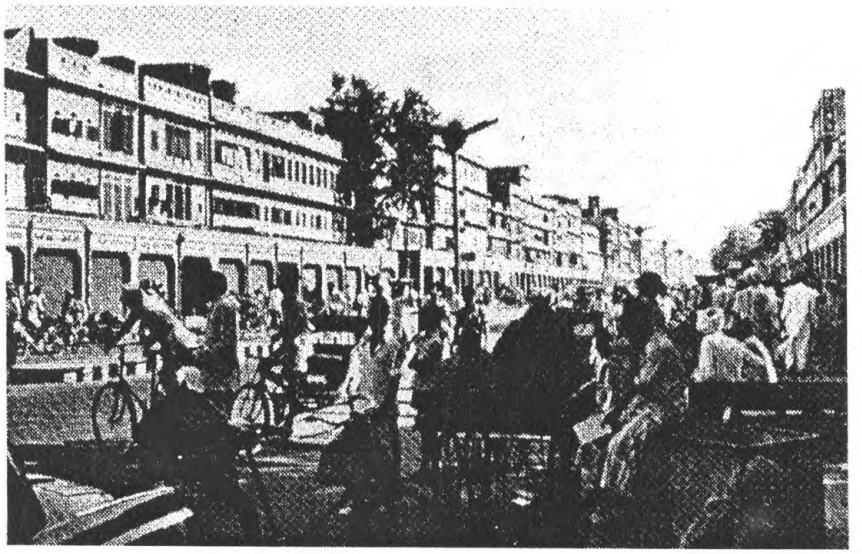


Fig. 6.25 A busy street in Jaipur, with a mix of pedestrian, slow-moving and high-speed vehicular traffic.

Fig. 6.26 Most of the *bazaars* have shops on the ground level and residences on the upper floors.

In Jaipur, the intersection of the *bazaar* streets have public squares called *chaupars*. These are small piazzas that served as recreation and commercial spaces. These squares are landscaped with pools and fountains and grassed areas. These spaces are also used for religious festivities. As is the case in most traditional Indian cities, these squares sometimes have small temples or shrines as important features.

CONCLUSION

The city of Jaipur designed as a definite geometric grid, with its *chowkris*, *bazaars*, *chaupars*, *mohallas*, *galis* and *havelis* forms a hierarchy that relates to social, cultural, climatic, economic, religious and technological factors. A considerable success initially, the city of Jaipur is today struggling to cope with new pressure for development and change. According to Sealey, "It (Jaipur) managed to provide a spatial framework within which social customs and economic activity of a large population could function effectively, and to this added considerable aesthetic character."[131] The city was originally designed to cover an area of around three square miles but today the city already covers more than 25 square miles. Today, the old city is surrounded by haphazard growth. Nevertheless, the character of the old city has been maintained because of the 25 feet high and 9 feet thick city wall surrounding it. Another reason for its survival is the road widths that fortuitously anticipated the age of modern transportation technology.

Though Jaipur forms a unique example of a designed city in India, the structure of the city with its *katras, mohallas, galis, chowks and havelis,* can be considered prototypical of North Indian cities. The morphostructure of Jaipur is thus useful in comparing Chandigarh with a traditional North Indian city.

CHAPTER 6.3

OLD DELHI: STUDY OF A TRADITIONAL INDIAN CITY

Delhi, the capital of India, is a kaleidoscope of different eras and cultures. Throughout its history, it has been exposed to diverse cultures ranging from the Turks who took over Delhi in 1191, to the Mughals who occupied it in 1526 and finally to the British who took command in 1803. Pieces of baked earthenware and pottery, dated 1000 B.C., unearthed in the region, provide the earliest evidence of the existence of a city on the present site of Delhi. There is also a legendary city by the name of Indraprastha[132], which is believed to have existed in the fifteenth century B.C. on the western bank of river Yamuna. In actuality, historians have identified seven different cities (Fig.6.27) that existed at various times before the British took over and added Imperial Delhi to the existing layers. These seven cities are Lalkot (972-1020), Siri (1296), Tughlakabad (1321), Jahan Panah (1334), Ferozabad (1351), Deen Panah (1530-55) and Shahjahanbad (1639).[133] After the British took over India, Delhi was in a state of neglect for some time until King George V, Emperor of the British Empire, moved the capital from Calcutta back to Delhi. The Imperial or New Delhi, designed by Herbert Baker and Edwin Lutyens, is sometimes called the eighth city of Delhi.

Although there are traces from all eight cities scattered around Delhi, it is the last two cities, Shahjahanabad (Fig.6.28) and New Delhi (Fig.6.29) that exist today in substantial measure and form the urban core of Delhi. These two cities coexist as a living

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[131] *Sealey*, p.19.

[132] It is believed that the earliest known capital city of Indraprastha was founded by the Pandava in 1450BC. Recent findings support the view that it was located in the Purana Qila area.
Delhi Government. (1999). *Delhi, National Capital Territory of India: History* [World Wide Web Page]. Available: http://delhigovt.nic.in/delhigovt/history.html . May 20. 1999

[133] Jain, A.K. (1990). *The Making of a Metropolis*. New Delhi: National Book Organisation.
Singh, Khushwant & Rai, Raghu. (1983). *Delhi: A Portrait.* Delhi: Oxford University Press.

dialectic between the traditional and the Western models of urban planning in India. Though both Old and New Delhi have undergone several changes caused by time and increased urban growth, they have managed to maintain their distinctive character. On one hand there are the narrow winding streets of Mughal Delhi and on the other the wide tree-lined avenues of Imperial Delhi. But it is the layout and functioning of Old Delhi that resembles the traditional Indian living pattern more closely than its British counterpart. Hence, a study of the walled city of Shahjahanabad is undertaken to characterize a traditional North Indian city.

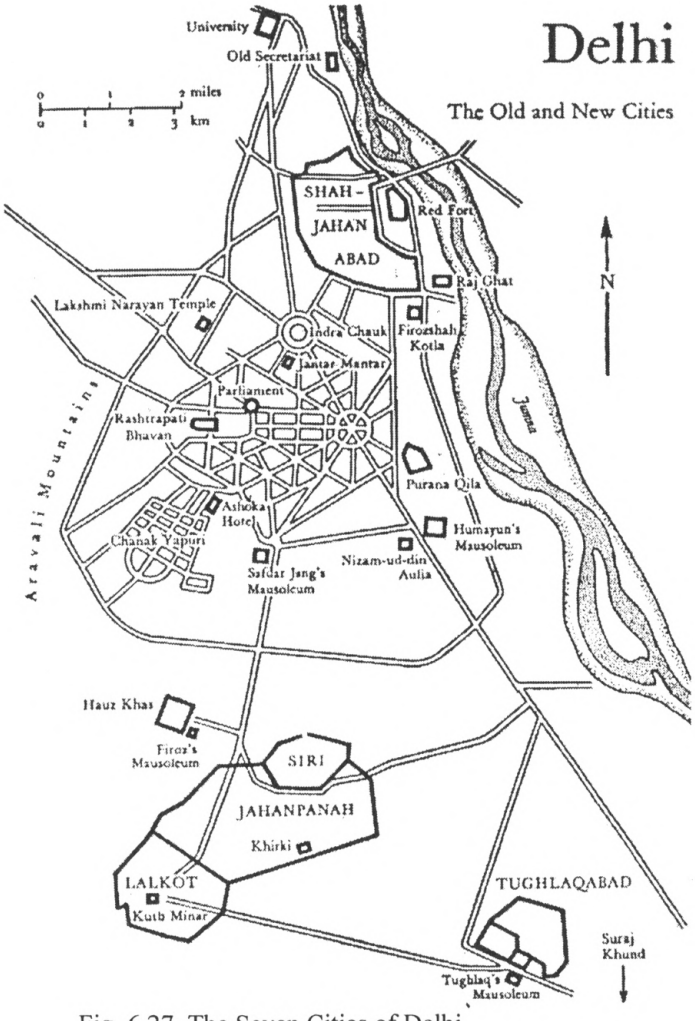

Fig. 6.27 The Seven Cities of Delhi

Fig. 6.28 The Walled City, Shahjahanabad.

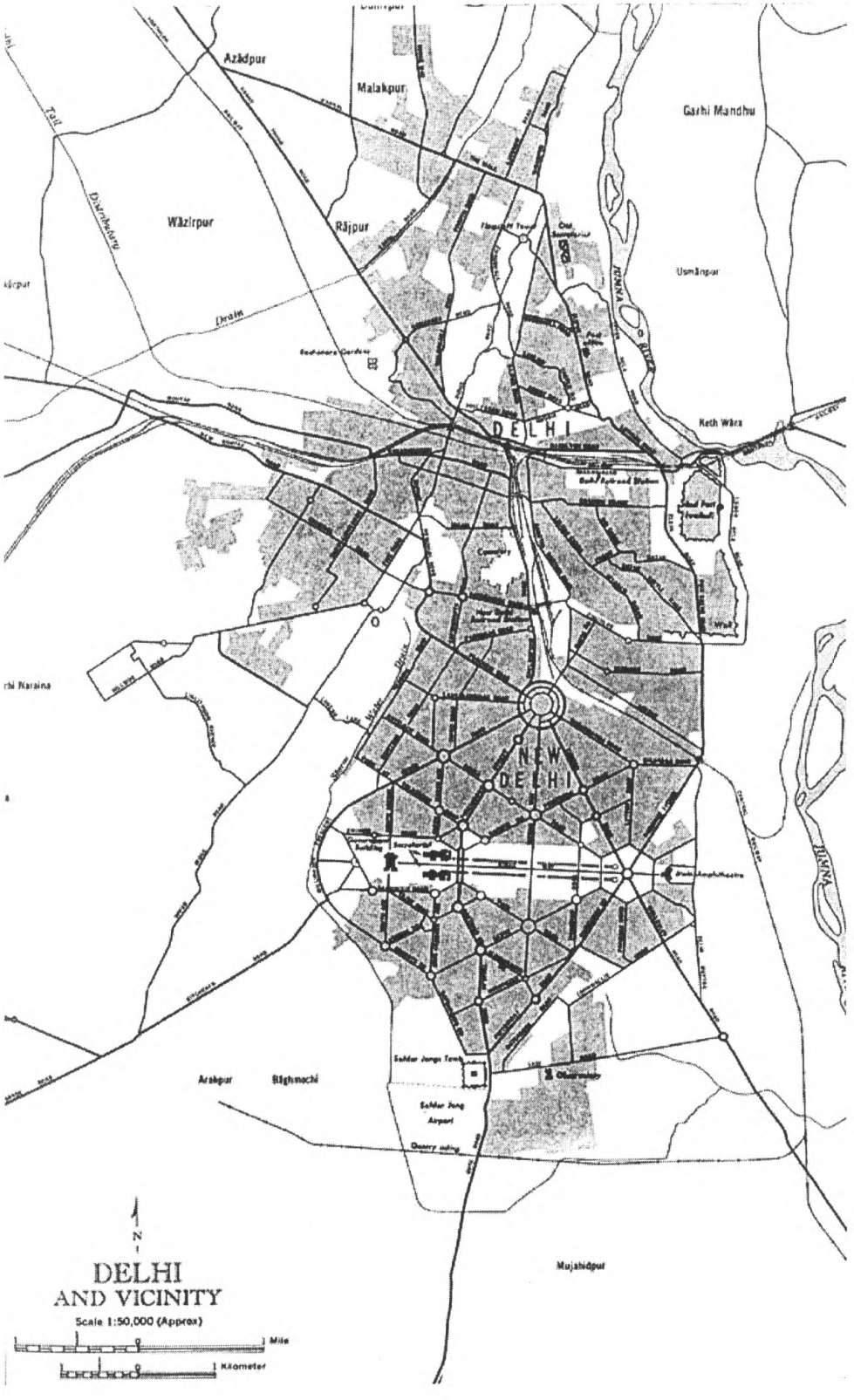

Fig. 6.29 Map of New Delhi.

OLD DELHI (SHAHJAHANABAD)

History and Evolution

The walled city of Old Delhi is one of the oldest surviving parts of Delhi. The seventh city of Delhi, the walled city, today forms one of the densest urban areas of the metropolis. Founded in 1639, it was named Shahjahanabad, after its founder, the Mughal Emperor Shahjahan. The city, sited on the banks of Yamuna River, grew around the royal palace that was housed in the Lal Quila or Red Fort (Fig.6.30). The city, laid out over an area of 1240 acres, was designed to accommodate a population of 60,000. Since its inception, the city grew steadily, with merchants and noblemen moving in to occupy spaces around the palace. Numerous features were added to the city, including several mosques (Fatehpuri Masjid, Jama Masjid and Kalan Masjid), private gardens (Begum Bagh) and several *bazaars* (Chandni Chowk and Faiz Bazaar). Paths leading from different parts of the city to these landmarks soon developed into an intricate network of streets and lanes with important commercial areas sited along them.

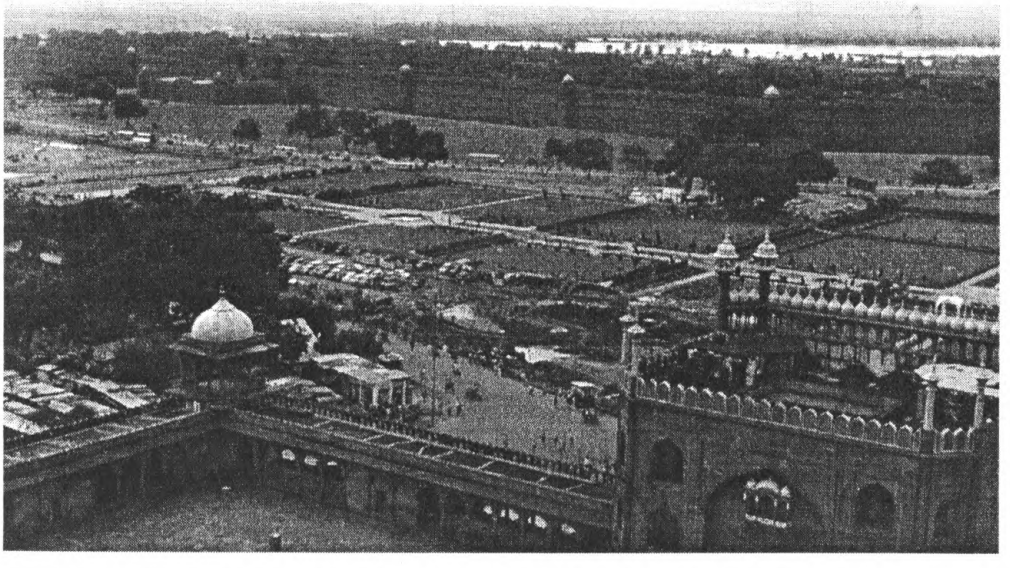

Fig. 6.30 View of Red Fort from Jama Masjid, with the River Yamuna in the background.

Shahjahanabad is characterized by narrow, winding streets (Fig.6.31) with high-density community living. The center of the city was the main business hub and the extremities, close to the city gates, were devoted to activities such as dairies, orchards and tanneries. The city was confined within a protective wall with eight gates leading to the main streets. With time the city and its environs grew. More people moved within the walled area, leading to congestion and straining resources. In the late seventeenth century, the city reached a peak population of 200,000 under Emperor Aurangzeb (son of Shah Jahan). In 1740, the growth of the city was marred by the brutal annihilation of around 150 thousand inhabitants by the Persian army under the command of Nadir Shah. The city and the palace were plundered and left in burning ruins.

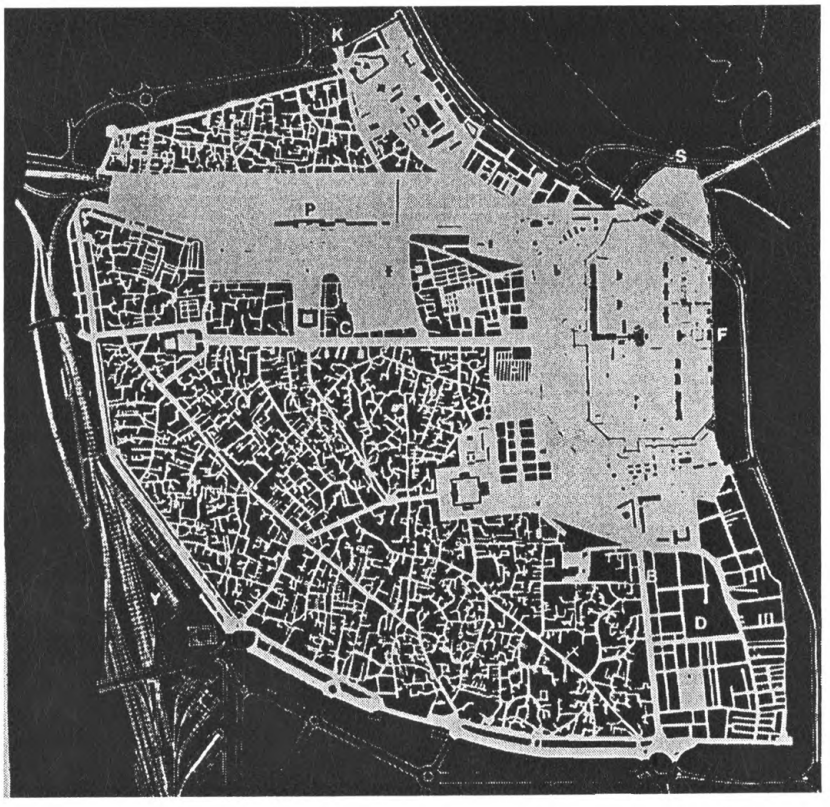

Fig. 6.31 The walled city is characterized by an intricate network of streets.

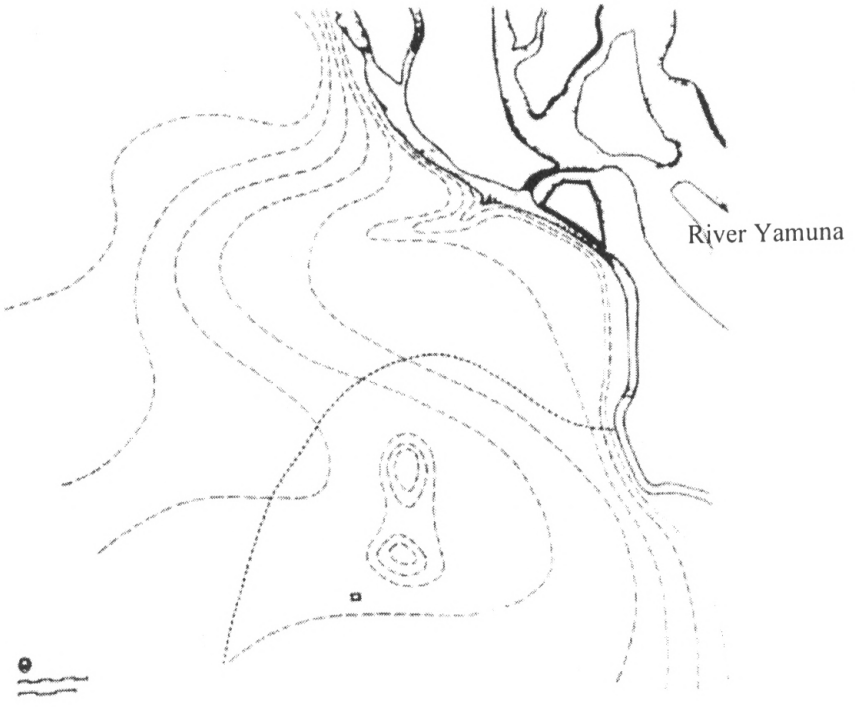

Fig. 6.32 The original Site of the Walled City along River Yamuna.

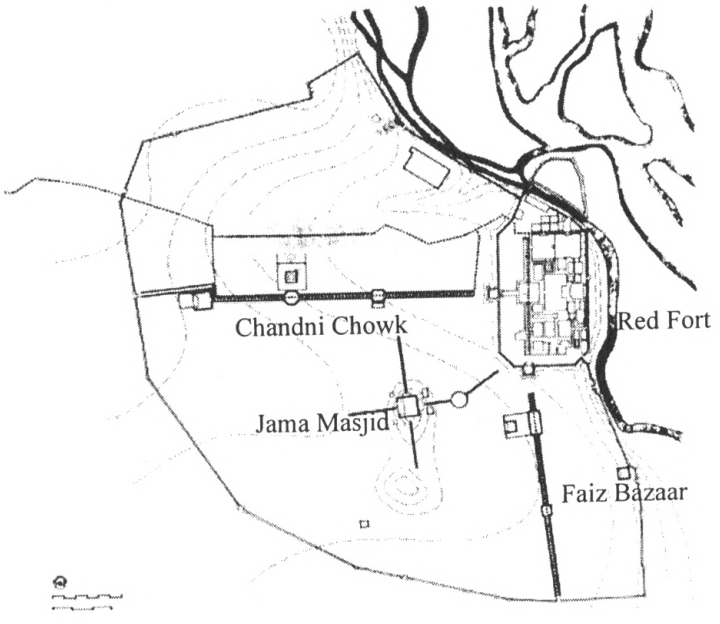

Fig. 6.33 The Red Fort and the Jama Masjid form the main components of Shahjahanabad along with the two boulevards.

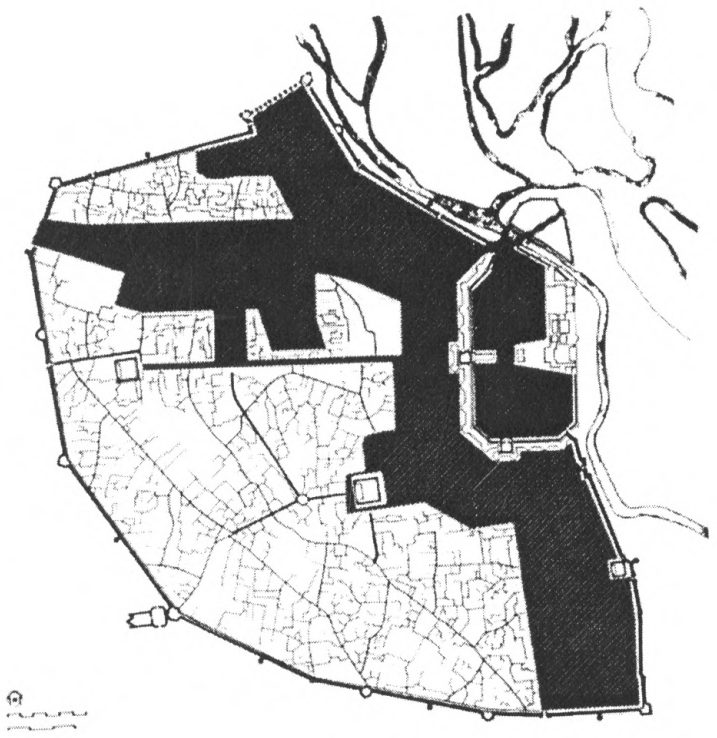

Fig. 6.34 Areas obliterated by the British are marked in black.

Fig. 6.35 Present day city of Shahjahanabad.

The city continued to decline steadily, until the British took over in 1803 and put a stop to the prevailing anarchy. At this time, British troops were brought into Delhi and quartered outside the city wall in an elevated area called The Ridge. Some British Imperial residences were built inside the walled city, in areas around the Red Fort but most were outside the city, adjacent to the barracks. The rise of Delhi was halted once again with the damage wreaked by the mutiny of 1857, the first war of Indian independence, which was won by the British. The city, being the focal point of the revolt, was looted and destroyed by British troops. Almost the entire population of Delhi was evicted. Troops were stationed within the city and the Red Fort. All buildings within a distance of 450 yards of the Red Fort and Jama Masjid were razed to the ground to clear space for the movement of troops and artillery. Emphasis now shifted to providing symbols to glorify Colonial rule in the city. Neo-classical style buildings were built in various places inside the city. An exclusive residential area, called the Civil Lines, was built north of the walled city to house British officers. Composed of classical style bungalows resplendent with acres of green lawns, the Civil Lines stood in glaring contrast to the congested inner city areas. Railways were brought inside the walled city, resulting in destruction of several sections of the city wall. This resulted in the development of the walled city area as a major trade center. The growth of the city reached its zenith in 1911, when Delhi became the capital of British India. There were several reasons for the transfer of capital from Calcutta, in the east of India, to Delhi situated in the north. One reason was the proximity of Delhi to Shimla, the summer capital of British India. Another was the deep-rooted association of Delhi with power, having served as the capital of numerous empires. According to Philip Davies:

It [Delhi] had been the Imperial capital for centuries and was the center of the Mughal Court. It was to here that the mutineers streamed in 1857, to the symbolic rallying point of Bahadur Shah, the last of the Mughal Emperors. By identifying with Delhi, the British were placing themselves in a direct historical continuum for traditionally the whole of India looked to the city as the focus of suzerain power in the sub-continent.[134]

The new capital was designed to symbolize the supremacy of British rule in India. It presented an opportunity to create an architectural image for British India, which would evoke its political agenda.[135] After much deliberation, a site, south of the walled city, was selected to house the new capital. The design of this new capital, New Delhi, was entrusted to the New Delhi Planning Committee headed by George Swinton, Chairman of the London County Council. Fundamental in the design of the city were two British architects, Sir Edwin Lutyens and Herbert Baker.

The layout of the new city, with vast ceremonial avenues and abundant open spaces, was based on Ebenezer Howard's Garden City ideals. The plan (Fig.6.36) was composed of several radiating axes within polygons, somewhat in the tradition of baroque classicism. The highlight of the design was the Viceroy's Palace, placed at the head of a ceremonial axis, and flanked by the secretariat buildings on either side. The symmetry of the new city represents an attempt by the British to impose order in what they saw as the chaotic Indian society.[136] In the design of the individual buildings, Baker and Lutyens combined European Classical architecture with elements from Indian architecture.

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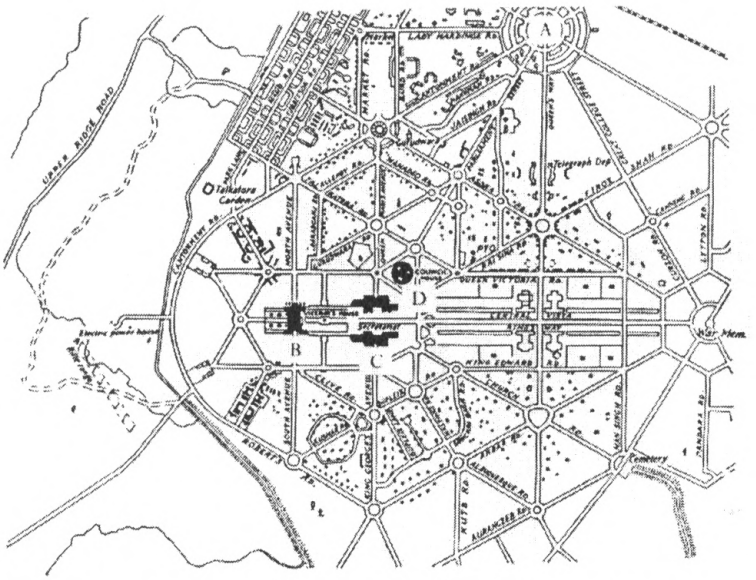
[134] Davies, Philip. (1985). *Splendours of the Raj: British Architecture in India, 1660 to 1947.* London: John Murray (Publishers) Ltd. P.222.
[135] Evenson, *The Indian Metropolis*, p.104.
[136] *Davies*, p.225.



139. Plan of the official quarter of New Delhi. A. Connaught Place, the commercial center. B. Viceroy's Palace. C. Secretariat. D. Council House.

Fig. 6.36 The Plan of Imperial Delhi is based on strong radiating axes.

Though essentially classical in form and proportions, the buildings had prototypical Indian elements such as *jaalis* (carved screens), *chattris* (small domed kiosks), and *chajjas* (projecting cornices). According to Davies:

> *[The design of New Delhi] represents the culmination of over two hundred years of persistent endeavor to achieve a true architectural synthesis of Eastern and Western styles. In Lutyen's magisterial Viceroy's House the architectural experiments which began in the 18th century to create an Anglo-Indian architecture in its own right reach a triumphant culmination.*[137]

Overall, both the buildings and the new city, monumental in scale and character, embodied the order of Imperial rule.

Fig. 6.37 Old and New Delhi, existing in juxtaposition.

With both attention and resources being focussed on the new capital, the walled city started to decline. Scope for its expansion was hampered by the construction of the new city to the immediate south and the Civil Lines in the north. Though adjacent to each other, no attempt was made to unify New Delhi with Old Delhi either physically or visually. The division between the two was made even more prominent by separating them by a strip of landscaped area (Fig.6.38). According to Norma Evenson:

> *New Delhi was conceived as a purely British settlement juxtaposed to the Indian city in the manner of what some termed "glorified civil lines." Old Delhi, with its intricate web of narrow winding streets and densely packed buildings, and New Delhi, with its geometric plan and vast*

[137] *Davies*, p.226.

spaces, were to remain dramatically different in form, as well as physically discrete.[138]

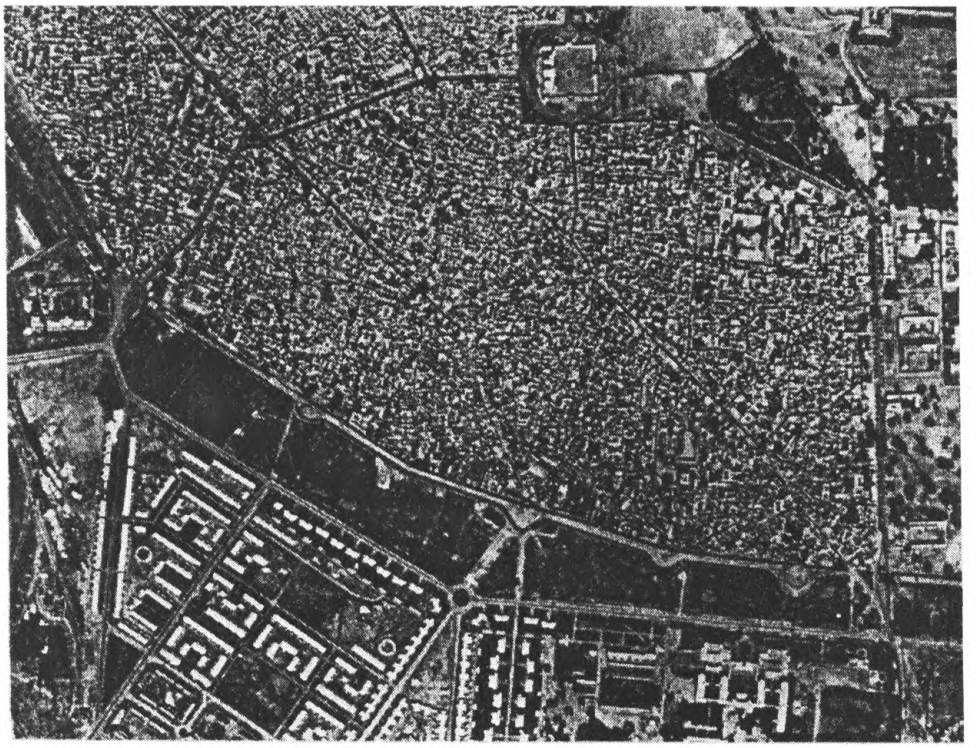


Fig. 6.38 A narrow strip of green was used to mark the division between Old and New Delhi.

Meanwhile, construction of the new capital caused a dramatic increase in the population of the city, leading to further congestion in Old Delhi. In 1936, the walled city was adjudged to have an excess population of 100,000.[139] Since the Independence of India in 1947, Delhi has grown beyond its boundaries, its population increasing by 26 per cent in the last eight decades. The partition of India caused hordes of refugees to flock to Delhi, almost doubling the existing population which increased from 0.91 million in 1941 to 1.79 million in 1951. All the eight cities of Delhi were swallowed up over time, to

[138] Evenson, *The Indian Metropolis,* p.148.
[139] *Ibid.*, p.150.

form one burgeoning city with a total land area of around 370,750 acres (570 sq.miles)[140] and a population of around 9,420,644 (Census of 1991).

Delhi's growing population has strained its resources to the utmost. To counter the urban sprawl, the National Capital Region Planning Board Act of 1985 was passed. It resulted in the constitution of a statutory board to control land use and prevent haphazard development. It proposes to divert and distribute population concentration and economic activities to peripheral towns, in an attempt to relieve the load on the urban center. It endeavors to coordinate the overall development of the hinterland and surrounding regions, to minimize disorder.

There have also been several proposals for the redevelopment of the old city of Shahjahanabad. One of them proposed decongestion by relocating about 45 percent of its population. Being an established commercial center, it was difficult to achieve such a goal. Several redevelopment and conservation proposals were initiated in the 1970's, but remain unrealized because of financial constraints.

Recently the population of the walled city has been slightly declining. During the decade, 1961-71, there was a 2.6 per cent decrease in its population, followed by a drop of 11.4 per cent during 1971-81.[141] In spite of this decline, Old Delhi has continued to be the l hub of the wholesale business in Delhi and remains a dense urban area. The form of the city, with its walls, has remained intact with few changes to this day, though there has been concern about the degree of crowding in this area.[142] Shahjahanabad, Old Delhi, can

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[140] Delhi Government. (1999). *Delhi, National Capital Territory of India: Geography & Climate* [World Wide Web Page]. Available: http://delhigovt.nic.in/delhigovt/geogra.htm. May 20, 1999.

[141] *Jain, A.K.*, p.79.

[142] According to a survey conducted in 1961, the gross density of the walled city of Old Delhi was 235,000 persons per square mile, fifteen times more than the density of New Delhi, which was 15,800 persons per square mile.
Fonseca, Roy. (1971). *The walled city of Old Delhi.* In *Ekistics*, January 1971, No.182. pp. 72-80.

be said to be a city where organic growth has shaped the character of the city, accounting for much of its character and vitality. In spite of complaints of congestion and overcrowding, Old Delhi is today recognized as "a vital embodiment of traditional Indian townscapes."[143]

MORPHOSTRUCTURE OF OLD DELHI

The city of Shahjahanabad, or Old Delhi, grew around the royal palace, the Red Fort, constructed in 1638. A magnificent mosque, Jama Masjid (Fig. 6.39), was built about five hundred yards southwest of the fort, and forms the spiritual heart of the city. The mosque, built on the top of a hill, and the fort, with its red sandstone ramparts, form the two major landmarks that define the geometric structure of the city. Wide, tree-lined boulevards extend from the main axes of the fort to the gates on the south and the west edge of the city. The two boulevards had stone-lined canals running down their center, supplying water to the palace, the gardens and the houses. The boulevards were lined with important buildings, monuments and formal open spaces. Both these boulevards, Chandni Chowk (Moonlight Walk), which developed along a path leading from the Red Fort to Lahore Gate, and Faiz Bazaar, south of the fort, soon became the commercial and social centers of the city. Of these two, Chandni Chowk (Fig. 6.40) was the more important. It is provided with *chowks* at intervals, dividing the boulevard into smaller segments. These *chowks,* piazza like urban spaces, form gathering spaces for the residents.

[143] Evenson, *The Indian Metropolis*, p.191.

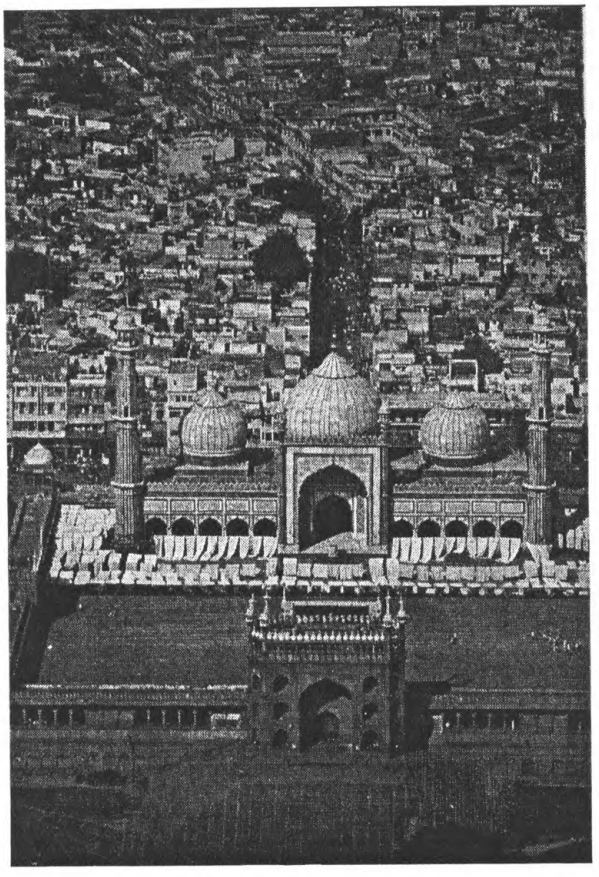

Fig.6.39 The Jama Masjid forms the spiritual core of the city.

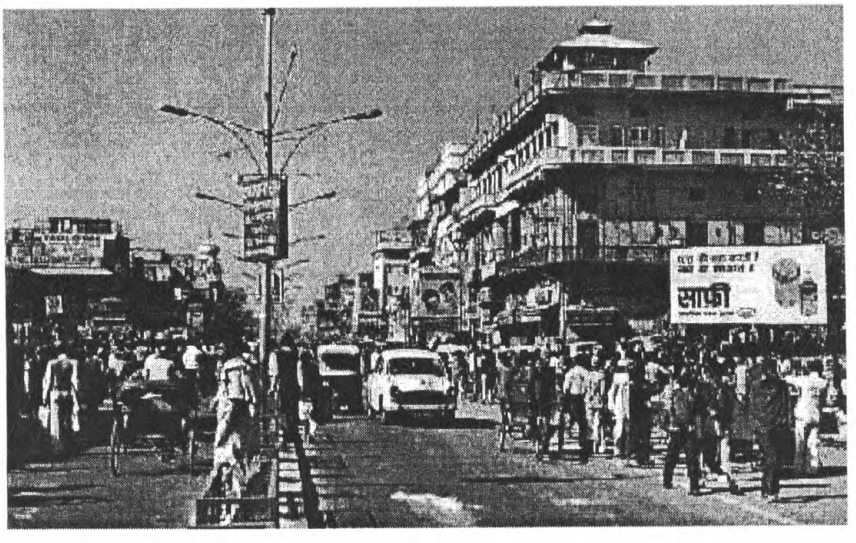

Fig.6.40 Chandni Chowk forms the main boulevard of Old Delhi

The population of the city was housed in three main sectors, developed along the two boulevards:

1. The area north of Chandni Chowk with its gardens, villas and palaces of the aristocracy.
2. The Dariyaganj sector, east of Faiz Bazaar, where the European merchants, clergy and native Christians had settled early.
3. The quadrant south of Chandni Chowk, where the bulk of the inhabitants resided and worked.[144]

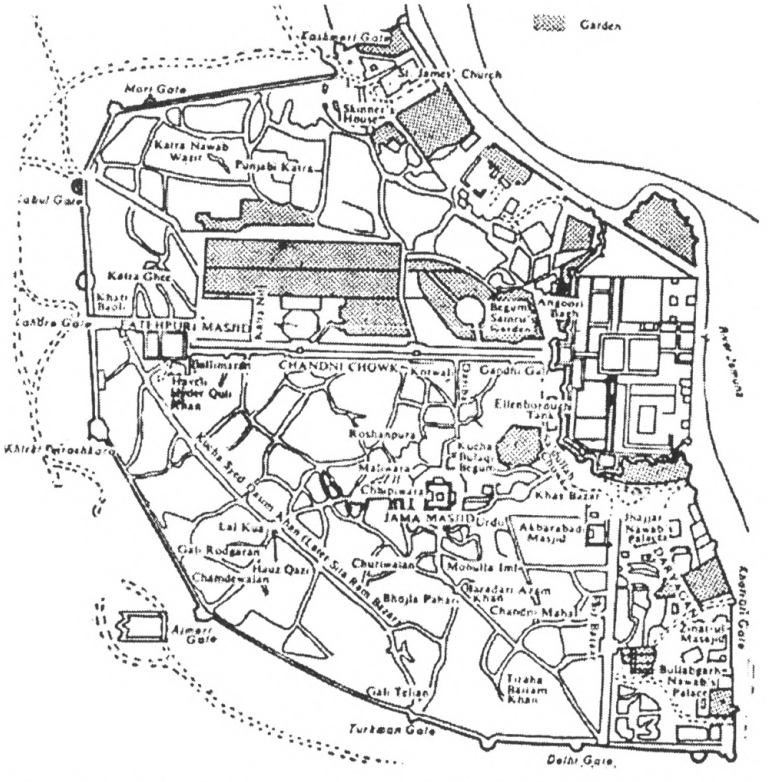

Fig. 6.41 The Walled City with its eight gates and many of landscaped gardens as it existed in the early part of nineteenth century.

[144] *Fonseca*, p.73.

The city was laid out in a definite hierarchical order, determined by the economic and social class of the occupants. The royal palace, the Red Fort, placed on one edge of the city occupied the seat of honor. Noblemen and higher income people came next in line, residing close to the palace and in the area north of the main boulevard, Chandni Chowk. The lower income people were relegated to the extremities, near the city walls. The city was divided into several zones called *katras*. These zones, forming distinct social groups, were created on the basis of occupation, commerce and industry. For example, Vaidwara was the quarter of doctors and Dhobiwara was the quarter of washermen. Each zone was further divided into a series of neighborhood units called *mohallas,* which originally depended on the patronage of the nobles and wealthy families. The *mohallas* are self-contained neighborhood units, developed along a spine street. They generally have clear nodes, but no clearly defined edges.[145] Residential units are in the form of two to three storied *havelis* with a combination of living and working spaces. The *havelis* are richly ornamented, embellished with motifs and decorated with elements such as carved brackets, *jaalis* and *jharokhas*. These elements lend a distinct visual character to the street. The building façades have a complex interplay of light and shade, generated by a series of projections and niches. The facades are never dull or monotonous. This vitality of the façade, is a very important element in Indian cities, providing them with a distinct character.

Commercial development is along *bazaars*, which are streets (*galis*) with development on either side. The built structure generally has shops at the ground level and residential quarters at the upper levels. The streets are characterized by closely

[145] Noe, Samuel V. (1982). *Old Lahore and Old Delhi: Variations on a Mughal Theme.* In *Ekistics*, Vol.149, No.295, July-Aug. 1982, Pp.306-319.

packed spaces that facilitate interaction with neighbors. This particular characteristic is generated out of a need to live in close-knit communities.

Thus, the structure of the walled city is composed of several elements ordered hierarchically, starting from *katras*, which are zones divided into smaller units called *mohallas*. *Mohallas* are a combination of residential and commercial units called *havelis*. The *havelis* are closely spaced, inward looking living units, located along narrow winding streets. These streets, called *galis/kuchas*, are developed as commercial *bazaars* or residential streets. These streets occasionally widen to form *chowks*, which are small piazzas that form the hub of community activities. A detailed description of these elements follows.

The Mohalla

The *mohallas* (Fig.6.42) are neighborhood units organized on the basis of caste, religion, family and place of geographic origin. The *mohallas* of Old Delhi are characterized by mixed land use. Most of these are a combination of commercial and residential uses radiating from a primary or secondary street that forms the spine. From this spinal-street, radiates a network of *galis* and *kuchas*. Mostly, a *mohalla* is a self-contained unit, each with its own school, market place and religious buildings, the population being between 500 to 3000 residents.[146]

Most *mohallas* are secure neighborhoods with strong kinship ties between the inhabitants. The residents generally know each other by sight and thus outsiders are easily recognizable. The security of the neighborhood is further ensured by providing

[146] Noe, *Old Lahore and Old Delhi: Variations on a Mughal Theme*, p.317.

gates at all the entry points. These gates are generally locked at night and the neighborhood guarded by watchmen. Thus, mohallas form secure, socially active and self-contained living areas grouped on the basis of occupation, caste or social standing.

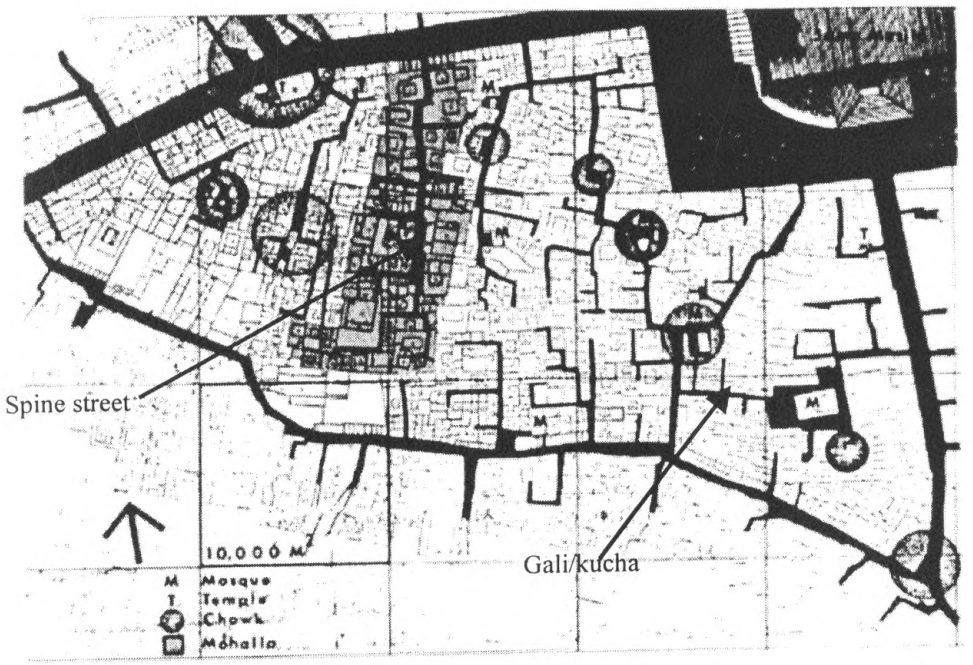

Fig. 6.42 A Mohalla in Shahjahanabad is developed along a spine street and has no clear edges demarcating its boundaries

Galis/Kuchas

Galis or *Kuchas* are linear streets (Fig.6.43) forming a complex system of pedestrian and vehicular traffic movement. The streets are ordered hierarchically in three levels. First is the primary street that forms the spine of most mohallas and is the widest of the three. Both traffic and development along the primary street is mixed. In most instances, though, the primary street is mainly marked by commercial development. The secondary streets, which branch off the primary street, also have mixed development. From the secondary streets, radiate the third level or tertiary streets. Many of these

tertiary streets terminate in dead-ends and are mostly residential galis protected by gates, which are locked at night.

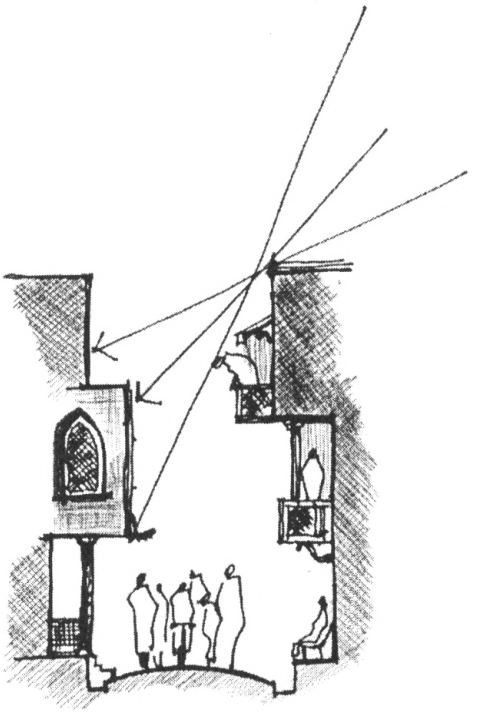

Fig.6.43 Section through a typical, Narrow, shaded street in Old Delhi.

Most of the galis are narrow winding streets with a prominent play of light and shade generated by projections from the buildings on either side. These projections are in the form of design elements like *chattas*, *chajjahs*, *jharokhas* and balconies. The height of structures along the street was generally greater than the width of the street, thus shading it from the harsh rays of sun. Narrow streets were a practical consideration at the time when there was no motorized traffic and shaded walking areas were necessary. Today, these narrow streets, with their mix of pedestrian and motor traffic, raise safety

concerns. It is remarkable that these streets have managed to keep a low accident rate, primarily because the traffic speed is very low.

Bazaar

Bazaars are streets with predominantly commercial development. The *bazaars* in Old Delhi are the center of wholesale and retail trade of Delhi. The primary streets support the bulk of major commercial activity. Secondary streets aredevoted to specialized items, sometimes the whole of a street being devoted to one category of goods. For example, *Chawri Bazaar* specializes only in printing shops. An important feature of the *bazaars* of Old Delhi is the occasional widening at junctions to form *chowks* that not only serve to relieve congestion but also form the most important social spaces of the walled city.

Chowk

A *chowk* (Fig.6.44) usually occurs with the widening of the streets at an intersection or at the turning of an important street. A very simple design element, it forms a breathing space in the narrow, winding streets of Old Delhi. It forms an important social space where a variety of community activities occur. *Chowks* usually have trees and a variety of street furniture, forming spaces where men sit under trees to nap, smoke or play cards, women gossip and children play. Hawkers and merchants lay out their wares for sale. They also host weekly speciality markets to which people flock from all parts of the city. Their significance is great, considering the lack of outdoor space within the *havelis*.

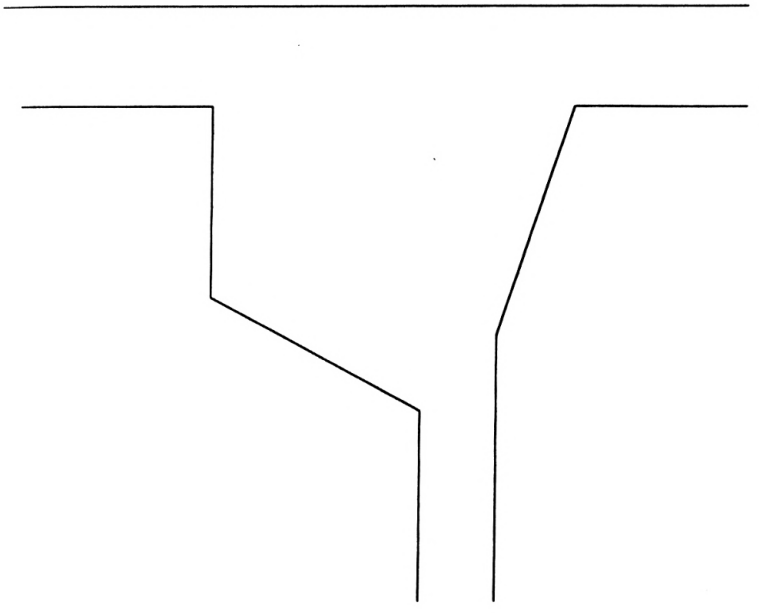

Fig.6.44 A *chowk* is formed by the widening of the street at a turning or at the junction of two streets.

Haveli

A *haveli* is a multi-storied, multi-functional residential unit in a traditional Indian city. *Haveli* (Fig.6.45) is inward looking in design, with most rooms opening into internal courtyards that accommodates most family activities. A *haveli* has one or more courtyards depending on its size. Some *havelis* have verandahs or covered walkways encircling the courtyard. The *verandah* or ambulatory forms a transition space between the rooms, the formal living spaces, and the courtyard, the informal space.

The *deori* or threshold (Fig.6.45) is an important transition space between the private and public space of the haveli. It is generally in the form of a raised platform or steps leading directly from the street into the *haveli.* Thus, there are three kinds of open spaces constituting the *haveli.* The street in front of the *haveli* forms the public open

space, while the entrance *deori* forms the semi-public open space. Both constitute spaces where neighbors interact and carry out several social activities. The *deori* also acts as a transition space leading into the private interior of the house. The internal courtyard comes next, forming the semi-private open space where the family carries out daily activities like washing, drying, eating and lounging. The courtyard (Fig.6.47) is not only a shaded open space, but it also brings in light and breeze into the interior of the rooms and is used for sleeping when the interior get too hot.

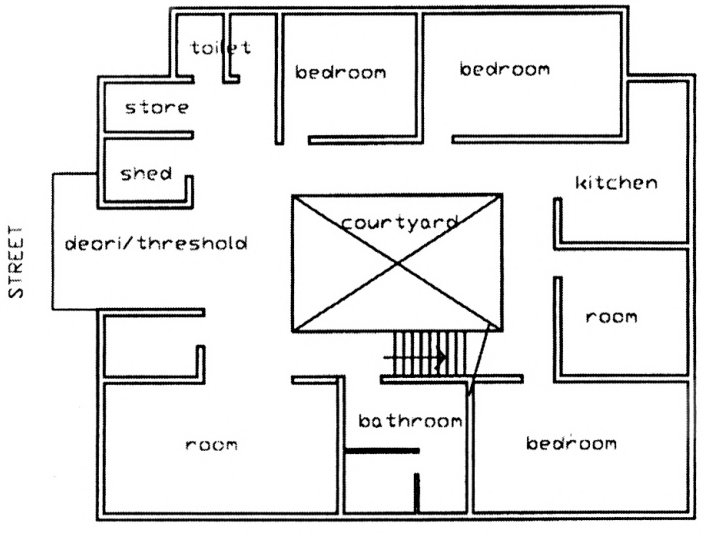

Fig.6.45 Plan of a *haveli* in Old Delhi, designed around a courtyard

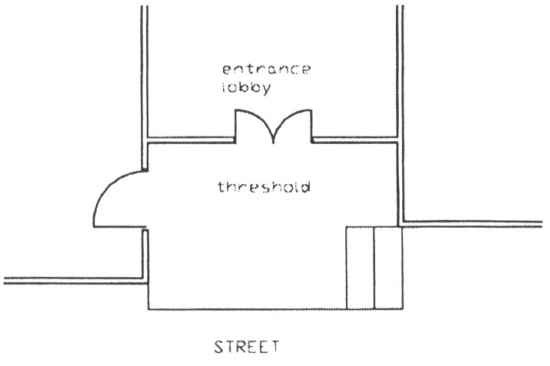

Fig. 6.46 The *deori* or the threshold forms the semi-public space leading from the street into the house.

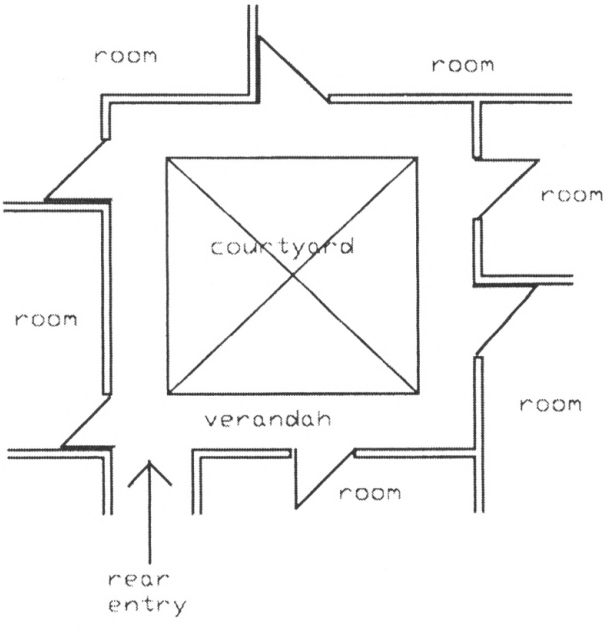

Fig.6.47 The *haveli* is designed with rooms grouped around an internal courtyard, that is in some instances surrounded by a covered ambulatory called a *verandah.*

Externally, the *havelis* have a variety of surface decoration, ornate projections and niches, carved *jaalis*, *jharokhas* and brackets. The embellishment on the façade represents the economic and social status of the *haveli* owner. The ornately carved

haveli's belonged to the nobles, rich businessmen and traders. The small and less ornate, closely packed *havelis* belonged to the workers, craftsmen and lower castes of the society.

Some *havelis* perform the dual function of serving as both residential and commercial space. The rooms fronting the street form the shops, with the workshops and stores at the back. In such a case, the residential quarters are provided in the upper floors. In some cases, the stores and workshops are located separately in some other spot in the mohalla. Overall, the *haveli*, is the most common and successful housing prototype not only in Old Delhi but also in the whole of North India in general.

Spatial Organization

The two landmarks in Old Delhi, Red Fort and Jama Masjid provide a formal structure to the city. The geometric ordering is further defined by the two boulevards, Chandni Chowk and Faiz Bazaar, that start from the Red Fort and end at the city gates. From these boulevards radiates an intricate network of primary, secondary and tertiary streets, as discussed earlier. Sited along these streets are residential zones called *mohallas*. Typically there is a strong hierarchy of spaces in a *mohalla*. The *gali* forms the public space, the porch or steps in front of the house and opening into the street form the semi-public space and the interior courtyards from the semi-private space. The *mohallas* are secure living spaces with a socially cohesive and familial group living in close proximity. There is a strong sense of place in a *mohalla*, with an immense feeling of kinship existing between the residents. The residents of a *mohalla* form social groups that carry out several group activities like organizing festivals, collecting funds for

maintenance and upkeep of the *mohalla*. Thus, the form and organization of a *mohalla* is based on the social and cultural needs of the people.

Mohallas are made up of clusters of closely spaced residential units called *havelis* that are inward looking courtyard houses. The interior courtyards (Fig.6.48) form the bulk of the open space in the city, where round ten to twelve per cent of a block area is devoted to streets and around twenty-five per cent to interior courtyards.[147] According to Rory Fonseca, "This is clearly a case of an introverted garden city where the open space in the community is public, not private."[148]

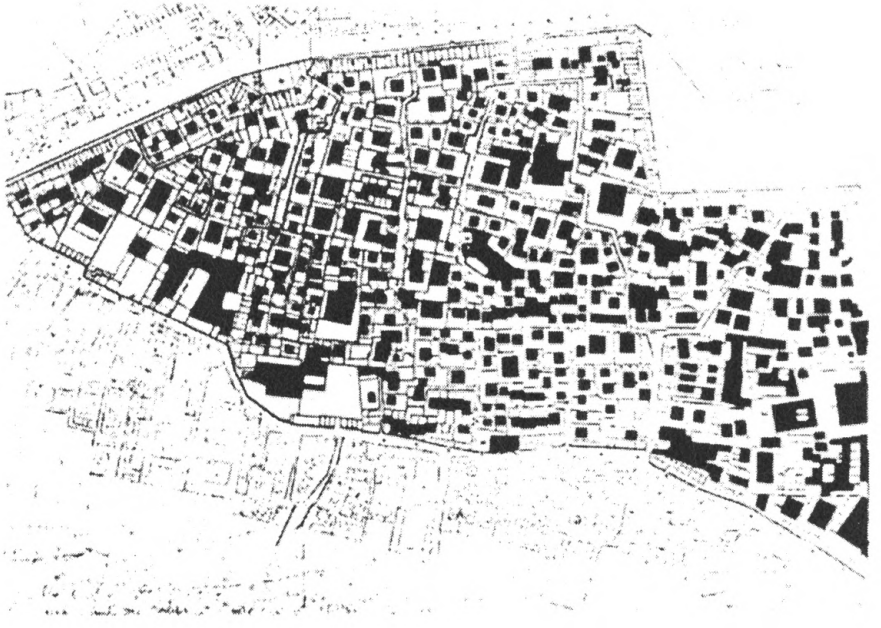

Fig.6.48 Around 25 per cent of the block are is interior courtyards, forming the bulk of open space in Old Delhi.

Privacy is a driving force in the organization and layout of an Indian city. The interior courtyards are mostly private spaces, the *deori* or the porch is the semi-private

[147] *Fonseca*, p.76.

space and the lane outside the house is the public space. These open spaces are opposed to the incidental open spaces[149] that occur in New Delhi, which was modeled on Ebenezer Howard's Garden City. The incidental open spaces occurring between the built areas and belonging to no one in particular, often lie in a state of neglect. Whereas the open spaces (in the form of courtyards, porches, streets and chowks) in Old Delhi are intensely used.

Climate is another important factor affecting the design of Old Delhi. Climate there is one of extremes, with temperatures rising to 120 degrees Fahrenheit in summer and dropping to freezing point in winter. Summer is characterized by hot and dry winds with frequent dust storms. The narrow streets lined with buildings higher than the street width, cut down the sun effectively, making the streets shaded thoroughfares while also protecting them from the dust storms (Fig.6.49).

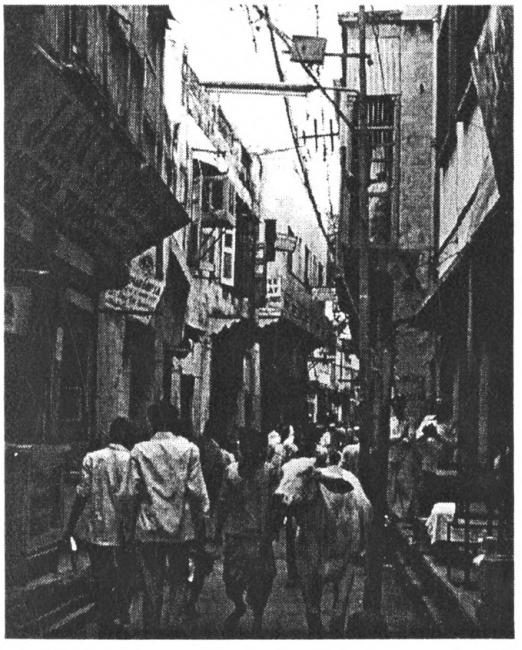

Fig.6.49 The streets are shaded thoroughfares.

[148] *Ibid.*

[149] According to a study, new development in Delhi has approximately1,200 square feet of ground area with 430 square feet as gross residential floor space per capita as opposed to 80 square feet per capita in Old Delhi. The major difference being accounted for by incidental open spaces.
Fonseca, The Walled City of Old Delhi, p.78.

The street is not a monotonous, linear entity, lined with buildings. Instead, every street has an element of surprise with unexpected twists and turns and frequent widening into *chowks*. Designed on a human scale, each street provides a varied experience with a collage of ornate facades (Fig.6.50) of *havelis* and shops.

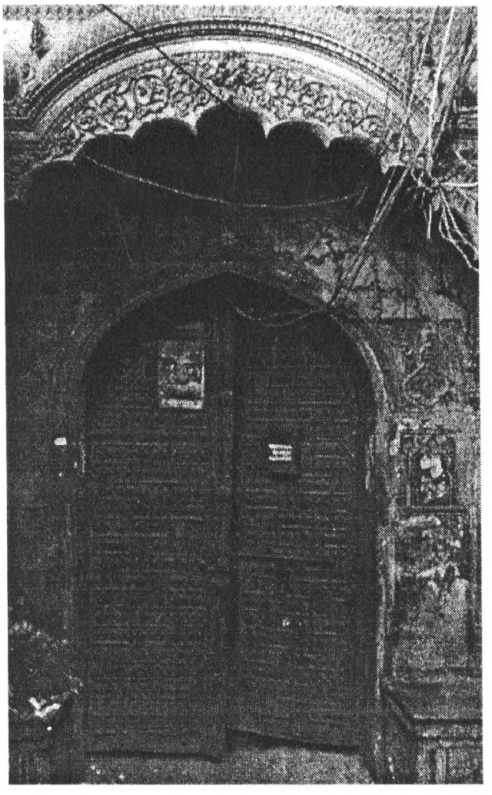

Fig.6.50 The ornate façade of a *haveli.*

Even the internal courtyards of *havelis* are designed to respond to the climate. Forming internal pockets, they are designed to trap cool air at night, making the space more bearable in the daytime.

Numerous façade elements have also evolved out of response to the climate. *Chajjahs* are cantilevered projections used to shade openings in walls. *Jaalis* are perforated screens that keep out the sun and dust, while letting light and breeze to

permeate through. Balconies and *jharokhas* are used to catch additional breeze while serving as viewing galleries too. These elements (Fig.6.51) also perform the function of adding vitality to the street picture.

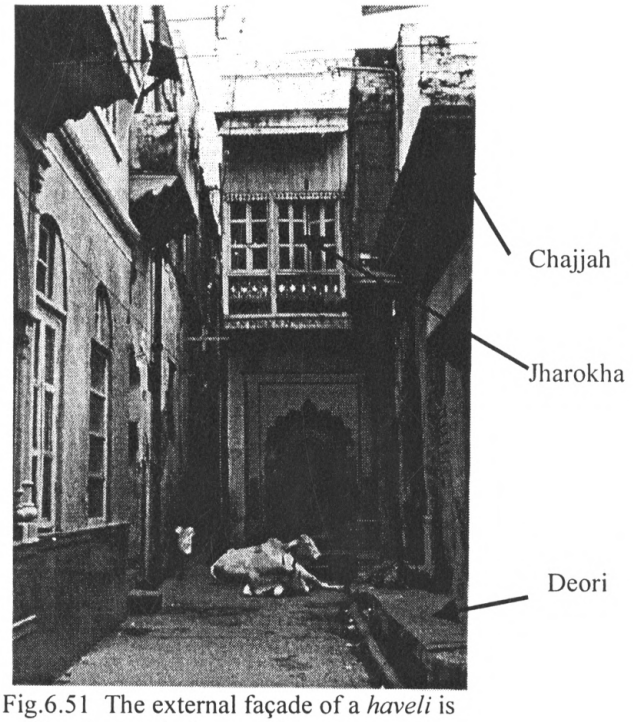

Fig.6.51 The external façade of a *haveli* is made of several elements like *chajjahs, jharokhas* and *jaalis.*

Though Old Delhi gives the appearance of being a cramped and congested city, with haphazard development all around, it certainly has an underlying order and structure that has evolved out of specific climate, social, cultural and economic needs of the people inhabiting it.

CONCLUSION

Over the years, Shahjahanabad has developed as essentially a Bazaar city, the emphasis being on commercial activity. The city presents an example of the character of

indigenous cities in India, which is mainly determined by the intimacy provided by the closely packed[150] spatial layout and mixed land-use. The layout of Old Delhi is a combination of planned, geometric structure interspersed with organic growth.

Though traditional cities in different parts of India vary in physical appearance, they have certain common characteristics. The most important of these are adequate open spaces and an underlying hierarchy in the layout of these open spaces. According to a study done by Rory Fonseca, a typical block in Old Delhi has 15% devoted to *galis*, *kuchas* and *chowks*; 6% to public monumental and religious space; 25% to internal courtyards and 54% to structures. In New Delhi, the ratios are very different, with 25% of the area devoted to roads; 12% to public spaces; 23% to parks; 16% is attributed to incidental open space and 24% to built-up area.[151]

In Old Delhi, land is more efficiently utilized both in terms of built-up and open areas. The city is characterized by a close network of residential, commercial, and community facilities, encouraging interaction and resulting in considerable savings in time, money, services and land. Land is a precious commodity in India, with its burgeoning population, which is now close to a billion. Increased migration from rural to urban areas has led to over congestion of metropolitan cities like Delhi. High-density urban areas are one way to counter urban sprawl, provided there is infrastructure to sustain such an increase in density. Old Delhi forms an example of such a high-density area, but with insufficient infrastructure facilities. Old Delhi, certainly has a lot of scope

[150] The residential density of Old Delhi is around 600 to 1200 persons per acre as compared to 100 persons per acre in New Delhi.
Fonseca, *The Walled City of Old Delhi,* p.79.
[151] *Ibid.,* p.79.

for improvement, provided sufficient effort and resources are spent to uplift the conditions in this heritage zone of the national capital.

According to Samuel Noe, there are two objectives of good urban design solutions:

> *[First] they should provide a clarity and order to the form of the city—structuring its fabric and organizing its individual works of architecture. In accomplishing this, the urban designer orients the inhabitants of the city and provides them with a sense of place at a variety of scales. Second, successful urban design improves the esthetic quality of the environment. This can result in a variety of emotional responses in the viewer, often deliberately induced: pleasure, calm respect for power, or pride.*[152]

The form and structure of Old Delhi, does serve its purpose and there is much to learn from it to arrive at a good urban design solution for the Indian people caught in a stage of transition between the old and the new.

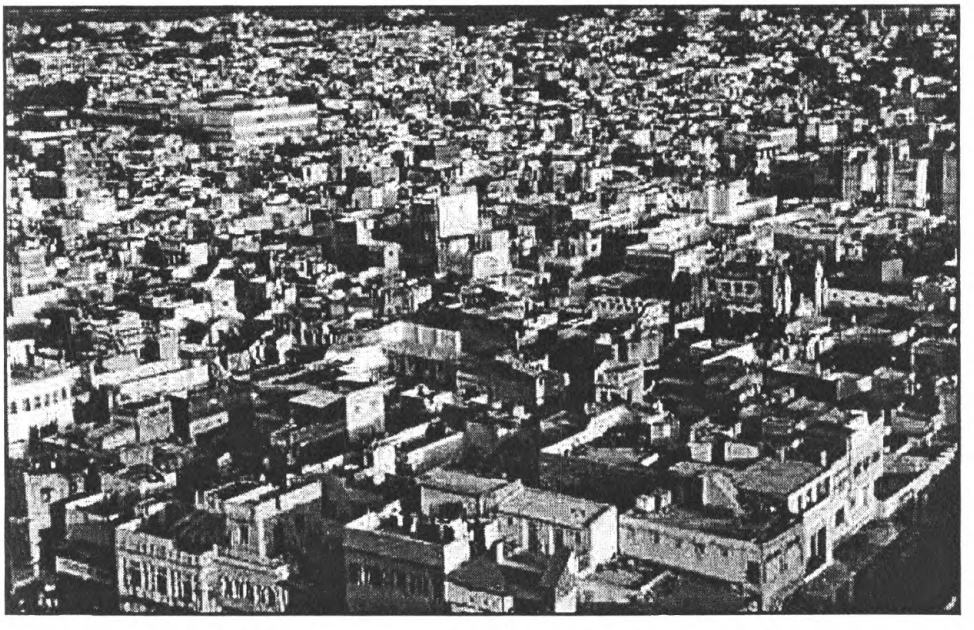

Fig.6.52 The dense, built-up mass of housing in Old Delhi.

[152] Noe, *Old Lahore and old Delhi: variations on a Mughal theme*, p.318.

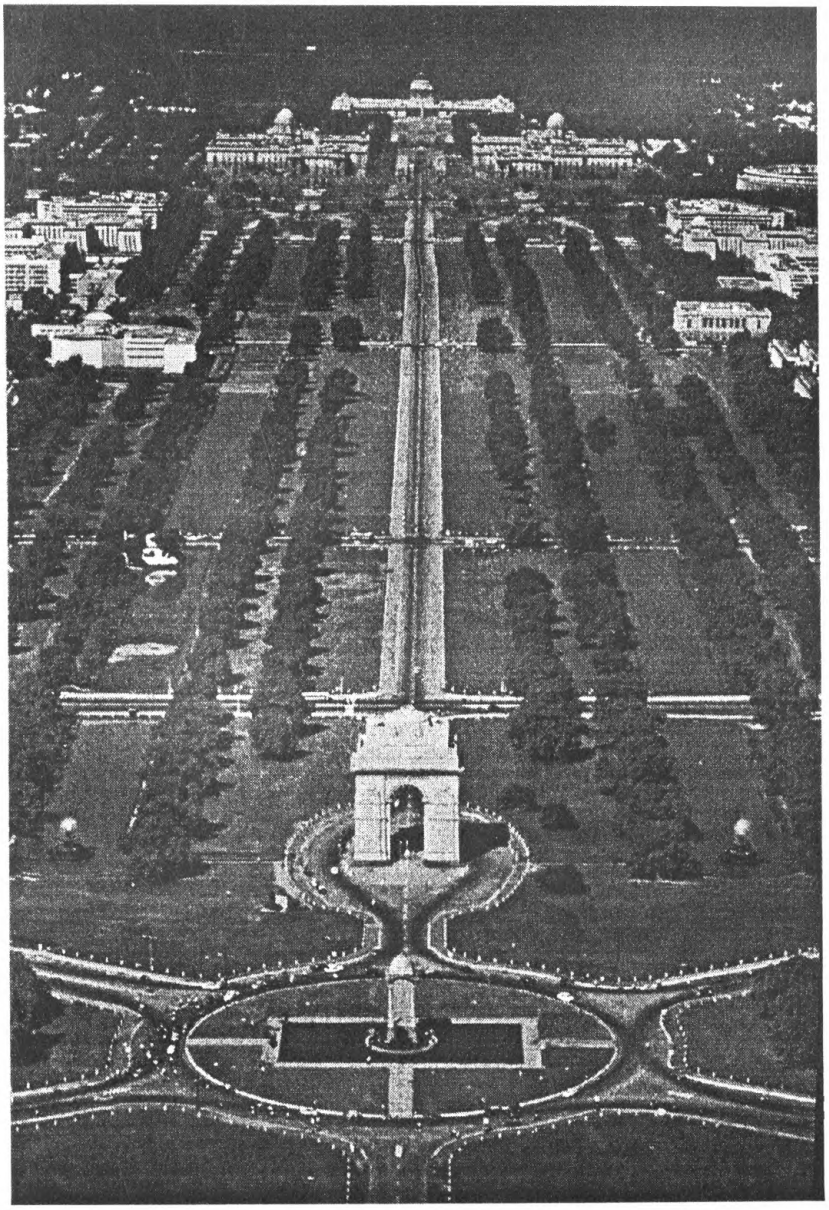

Fig.6.53 India Gate New Delhi: In contrast to Old Delhi, New Delhi is characterized by wide, tree-lined boulevards, forming ceremonial axes of the city.

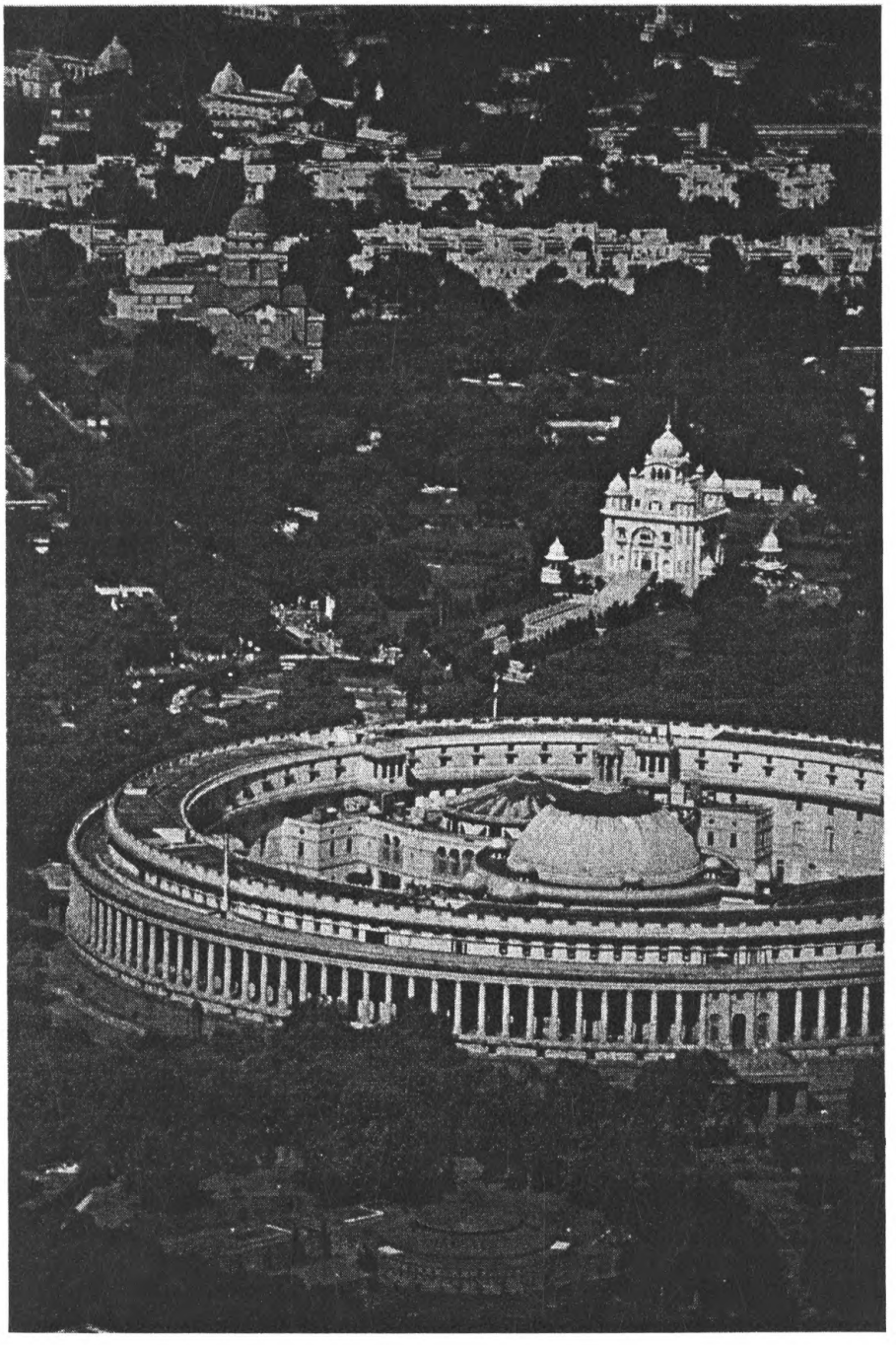

Fig.6.54 The Parliament House by Herbert Baker in the foreground. New Delhi has a relatively low density of built-up mass.

SECTION 7

COMPARISON OF CHANDIGARH WITH TRADITIONAL NORTH INDIAN CITIES

We will rectify the pilot plan after our trip to India....We must begin from the beginning....India had, and always has, a peasant culture that exists since a thousand years! India possesses Hindu temples (generally in carved stones) and Muslim temples in red stone, the architectural beauty of which is very geometrical. But India hasn't yet created an architecture for modern civilizations (offices, factories, buildings).

- Le Corbusier[153]

[153] Quoted in: *Kalia*, p.87.

CHAPTER 7.1

COMPARISON OF SECTORS 22, 41 AND 61

To conduct an analysis of the urban structure and the normative fabric of Chandigarh and the changes it has undergone over time, one sector from each of the three phases of the city has been selected. Each sector is analyzed both in terms of the morphostructure and the design and layout of individual components such as housing, open spaces, commercial areas and institutional development.

THE THREE PHASES OF CHANDIGARH

Le Corbusier had proposed the development of Chandigarh to take place in three phases. The first phase involved the development of Sectors 1 to 30. The second phase was to constitute an increase in density of the first phase sectors and the third phase was to involve the construction of Sectors 31 to 47. Le Corbusier was aware of the need to increase the density of Phase I sectors at a later date, but he did not anticipate the pace at which the city grew, leading to a shortage of houses. During the years 1961-71, the population of Chandigarh rose from 89,321 to 218,743 that is by approximately 145%.[154] At the end of 1981, it had risen to 379,660 (75.55%) and in 1991, the population was 510,565 with a decennial growth rate of 42.16%.[155] The population projected for the year 2000 is 828,791 and for 2010 it is 1,038,576 (Fig. 7.1). It is clear that the population of Chandigarh has overshot the size it was planned for. Such a phenomenal growth of the

[154] The population data is for Chandigarh City, excluding the villages.
Krishan, Gopal. (1997). *Chandigarh 2020: Projections of Population and Class Structure*. New Delhi: Swan Publishers. P.15.
[155] *Census of India*, 1991.

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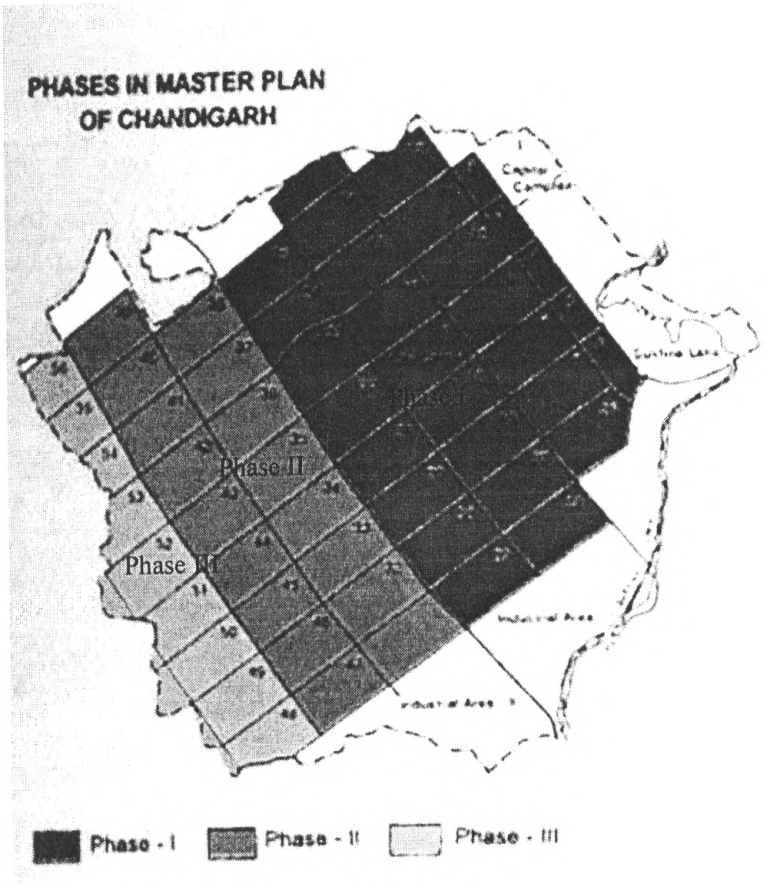

Fig. 7.2 The Three Phases of Chandigarh.

Phase II extends from Sectors 31 to 47 and was designed to accommodate 350,000 people, more than twice the first phase sectors. Thus, within these seventeen sectors there was a considerable increase in population density. As compared to the detached houses on sprawling plots in Phase I sectors, Phase II is dominated by terrace housing on smaller plot sizes, and increased vertical development (up to a maximum of four storeys). Phase III, being developed presently, extends from Sector 48 to Sector 61 and has no plotted development. It consists solely of two to four-storeyed housing blocks developed by the Chandigarh Housing Board (CHB) and several co-operative housing societies.

TABLE 7.1

Density of population and housing of the sectors in Chandigarh.

Sector	Area (Sq. Km.)	Area (Acres)	Census of 1981		Census of 1991		Census of 1981		Census of 1991	
			No. of Houses	No of Houses per acre	No. of Houses	No of Houses per acre	Total Population	Overall Density	Total Population	Overall Density
1	4.06	1015.00	50	0.05	15	0.01	205	0.20	53	0.05
2	0.29	72.50	130	1.79	165	2.28	528	7.28	591	8.15
3	0.36	90.00	131	1.46	142	1.58	529	5.88	719	7.99
4	0.36	90.00	169	1.88	119	1.32	726	8.07	557	6.19
5	0.34	85.00	226	2.66	188	2.21	666	7.84	701	8.25
6	0.43	107.50	33	0.31	14	0.13	156	1.45	41	0.38
7	1.03	257.50	2978	11.57	2472	9.60	13,166	51.13	11,594	45.03
8	1.06	265.00	1635	6.17	1411	5.32	7168	27.05	6739	25.43
9	1.14	285.00	568	1.99	605	2.12	2647	9.29	2613	9.17
10	1.12	280.00	739	2.64	644	2.30	4292	15.33	3809	13.60
11	0.99	247.50	1063	4.29	1040	4.20	5316	21.48	5187	20.96
12	1.38	345.00	642	1.86	1024	2.97	5352	15.51	5857	16.98
14	1.21	302.50	1266	4.19	1264	4.18	7955	26.30	7055	23.32
15	1.08	270.00	4348	16.10	3804	14.09	17,953	66.49	16,513	61.16
16	1.08	270.00	1327	4.91	1257	4.66	5984	22.16	5358	19.84
17	1.14	285.00	387	1.36	276	0.97	1514	5.31	1420	4.98
18	1.07	267.50	1833	6.85	1625	6.07	8628	32.25	7843	29.32
19	1.07	267.50	2464	9.21	2374	8.87	12,142	45.39	11,647	43.54
20	1.09	272.50	6354	23.32	5295	19.43	29,767	109.24	26,079	95.70
21	1.08	270.00	3566	13.21	3012	11.16	15,635	57.91	13,669	50.63
22	1.16	290.00	5555	19.16	4468	15.41	28,589	98.58	22,230	76.66
23	1.20	300.00	4054	13.51	3541	11.80	19,353	64.51	16,827	56.09
24	0.89	222.50	1658	7.45	2014	9.05	8308	37.34	9544	42.89
25	1.03	257.50	2263	8.79	2585	10.04	9115	35.40	9447	36.69
26	2.00	500.00	3739	7.48	272	0.54	18,925	37.85	1899	3.80
27	1.07	267.50	3802	14.21	3116	11.65	17,104	63.94	14,611	54.62
28	1.08	270.00	2113	7.83	2356	8.73	10,363	38.38	10,945	40.54
29	1.25	312.50	2506	8.02	2806	8.98	11,938	38.20	13,658	43.71
30	1.11	277.50	2199	7.92	2446	8.81	11,094	39.98	11,698	42.15
31	1.07	267.50	2211	8.27	2354	8.80	8048	30.09	9395	35.12
32	1.06	265.00	1231	4.65	2076	7.83	5407	20.40	9822	37.06
33	1.06	265.00	1200	4.53	1551	5.85	4775	18.02	6435	24.28
34	1.20	300.00	990	3.30	1337	4.46	4225	14.08	5896	19.65
35	1.07	267.50	2908	10.87	3085	11.53	12,571	46.99	13,338	49.86
36	1.07	267.50	514	1.92	758	2.83	2411	9.01	3705	13.85
37	1.07	267.50	2841	10.62	3808	14.24	12,101	45.24	16,688	62.39
38	1.08	270.00	1474	5.46	2823	10.46	6215	23.02	13,032	48.27
39	1.08	270.00	165	0.61	439	1.63	452	1.67	1903	7.05
40	1.08	270.00	1158	4.29	3815	14.13	4693	17.38	17,334	64.20
41	0.67	167.50	69	0.41	2985	17.82	237	1.41	13,070	78.03
42	1.21	302.50	13	0.04	456	1.51	17	0.06	1733	5.73
43	1.91	477.50	303	0.63	836	1.75	1116	2.34	3544	7.42
44	1.07	267.50	412	1.54	2574	9.62	1281	4.79	11,447	42.79
45	0.75	187.50	560	2.99	2412	12.86	1934	10.31	10,883	58.04
46	1.08	270.00	91	0.34	1776	6.58	277	1.03	8411	31.15
47	1.07	267.50	2184	8.16	3470	12.97	8691	32.49	14,754	55.16

The population density of Chandigarh has steadily increased through the three phases of construction (Refer to Table 7.1). The average population density in Phase I

sectors is 30.61 persons per acre, whereas in Phase II it increased to 37.65 persons per acre. These statistics are from the Census of India, 1991, when the Phase II sectors were still under construction. At present, the density of Phase II sectors has increased marginally above the 1991 statistics. The population density of Phase III sectors is proposed to be considerably higher than the first two phases, to cater to the demands of the growing city.

Thus, as the population of Chandigarh is growing, so is the housing density. The population density of some of the first phase sectors is still very low. There have been several proposals to redensify the first phase sectors but none of them have met approval either from the government or from the general population, though some changes in land use have been permitted in these sectors. In general, the population density of Chandigarh is still low as compared to other towns and cities in the region.

STUDY OF A PHASE I SECTOR

SECTOR 22

Sector 22 was the first sector to be built in the first phase of construction of Chandigarh. It was designed as a high-density, low-income district. It consists of several categories of government housing and low-income private housing. The sector also contains important commercial development along the V2 and V3 boundary roads. This was the first commercial development in the city and served as the city center until Sector 17 was constructed. It is one of the few sectors to have received the complete attention of the design team of Jane Dew, Maxwell Fry and Pierre Jeanneret, and soon became a model for future development in the city. The variety of 'styles' in the works of Drew,

Fry and Jeanneret in this sector, led to the development of the so-called 'Chandigarh Style', which is marked by terraced housing, an abundance of brick *jaalis*, the use of exposed brick-work and the straight lines and plain facades typical of the International Style. Such a style, being new to India, was quickly adopted by the general population who associated it with being modern and forward looking. The architecture of Drew, Fry and Jeanneret was, thus, adopted almost instantly and integrated into the Indian milieu.

Housing types designed by the original architectural team and developed later by a team of Indian architects including M.N. Sharma and E.U. Chowdhury, form the distinct cityscape of Chandigarh. Though several variations were produced in all fourteen housing categories, they became standard over time, leading to monotony in the overall picture of the city. Nevertheless, the housing designed by the architectural team is important in understanding the city and the shape it took in subsequent years.

Various factors in the design of a typical sector and its housing have already been discussed. In light of these factors, the morphology and spatial structure (or the morphostructure) of Sector 22 is studied in the following section.

MORPHOSTRCTURE

Sector 22, like other sectors in the city, is inward looking and self-contained with an internal shopping street, primary, secondary and nursery schools, a health center, a recreational zone and several religious institutions. The sector is bounded by high-speed traffic roads, the V2 and V3 roads (Fig.7.3). The V2 roads enclosing Sector 22 are *the Jan Marg* (People's Avenue) that leads to the educational and cultural zone of the city, and the *Dakshin Marg*, which formed the southern most avenue in the first phase of

Chandigarh. The V3 roads are, the *Himalya Marg*, which frames a splendid view to the Shivalik Hills and the *Udyog Path*, which has important business development along it. From the V2 and V3 roads, traffic enters the sector at only four points, two of which connect to the V5 loop road and two to the V4 shopping street. Dividing the sector is a zone of green space running north to south, which joins the green zone of Sector 35, located to the south, making a continuous strip of green. To the north is Sector 17, the City Center, which does not have a central green space, thus, causing a break in the linear open space, which usually runs uninterrupted through most of the sectors.

The central green zone in Sector 22 houses the educational and recreational facilities of the sector. The sector is bisected horizontally by the V4 shopping street, which provides the residents with the daily use shopping facilities. The V4 shopping street connects, across the V3's, to those in the adjacent sectors. The shopping street and the green space, thus divide the sector into quarters called sub-sectors, which are designated Sector 22-A, B, C and D. Within these sub-sectors is the housing, interspersed with green areas. Thus, the skeleton of the sector is formed by the road system, which is arranged in a definite hierarchy depending on the size of the road, the speed of traffic it caters to and its location within the overall network. Within this skeletal framework, the space distribution and the internal structure of the sector is formed by an interplay of solids and voids, open and covered spaces, yielding a figure/ground[157] pattern that gives the city its uniqueness and charm.

[157] Figure/ground plans form, " an abstract representational technique for urban form analysis and design." According to Wayne Copper, urban spaces are, "figures cut out of the ground of the surrounding texture", and buildings are, "positive masses...normally seen as figure." Such an analogy is a relative one and depends on the relative dominance of the two, the solid and the void. Thus, figure and ground can be interpreted as being reversible depending on which one is defined more strongly. There are several alternates described by Copper. They are: Dominant solids placed into a void; dominant voids shaped by solids and solids setting up a field within a void as in Plan Voisin by Le Corbusier.

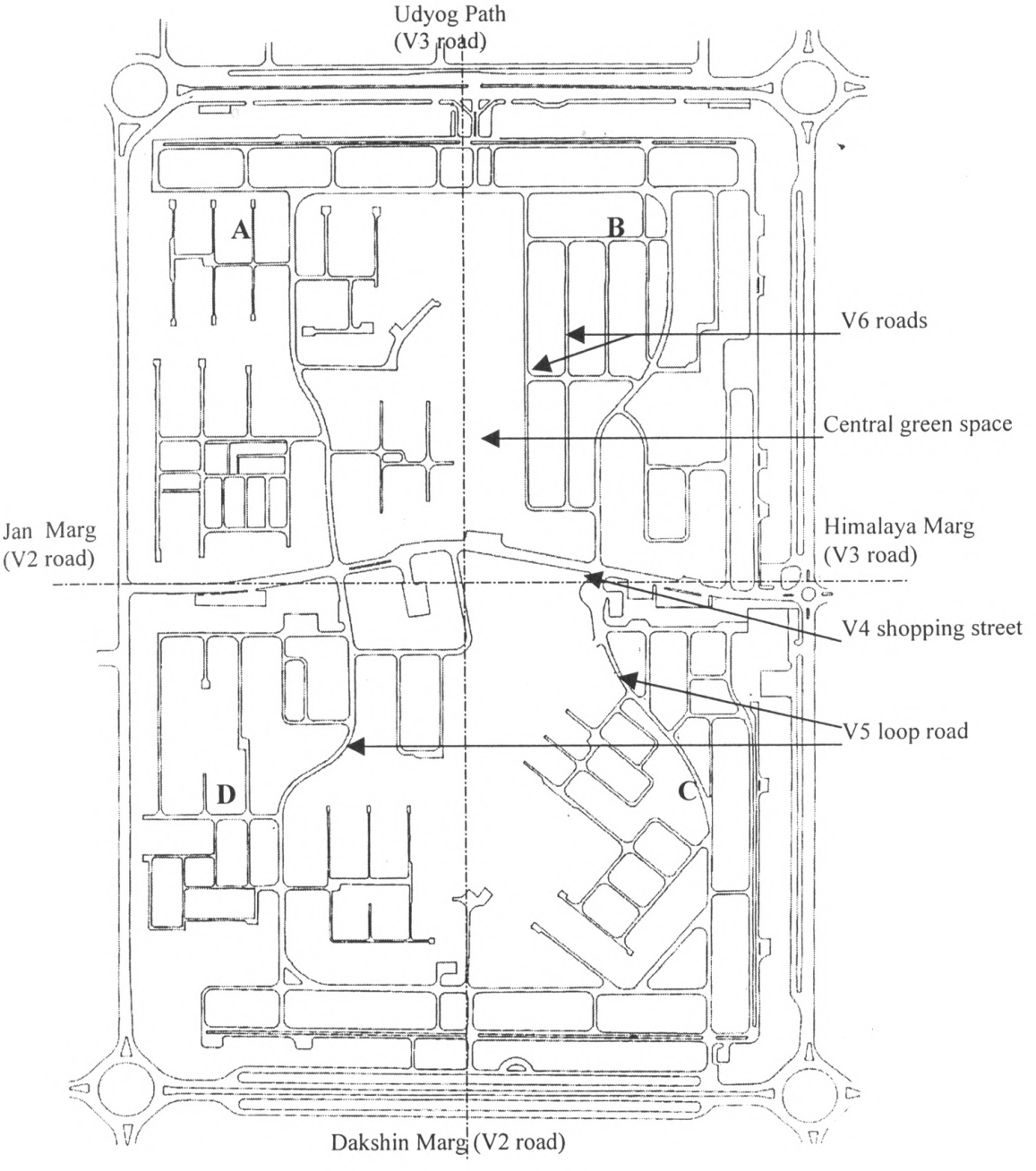

Fig. 7.3 The road network of Sector 22.

The structure of the sector is studied using figure-ground plans (Plate 7.1) of the sector, which clarify the extent and relationship between the open and built up areas. It is

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Copper, Wayne. (1983). *The Figure/Grounds*. In *The Cornell Journal of Architecture*, Fall 1983, Vol.2, pp.42-53.

clear that the built-up areas are placed geometrically within the open areas, forming a case of "solids setting up a field within a void."[158] Housing blocks are, thus, 'solids' placed within the 'voids' formed by the open spaces. There is no definite enclosures established by this figure/ground interplay and neither the solid nor the void is dominant. It is probably such a lack of a definite spatial enclosure, which renders the open spaces relatively unusable and also result in the lack of cohesiveness in the sector. From the figure/ground plans it is clear that the housing blocks are arranged in segregated groups that do not bear a definite relationship to each other, but create independent fields of their own. The design of individual units is noteworthy but their arrangement on the scale of a sub-sector is loose.

The open spaces account for a substantial amount, almost half the area of the sector, giving the sector a garden-like setting. Housing blocks in the sector are separated by green areas at frequent intervals, making the overall density of the sector considerably lower than that in traditional Indian cities where such open areas are infrequent.

The sector covers a total area of 290 acres with a housing density of 15.41 houses per acres and a population density of 76.66 persons per acre.[159] The density of population in Sector 22 is much higher than the average density of population in the first phase sectors, which is 30.61 persons per acre. The social grouping of the sector is formed by a majority of low to middle income residents. As in the rest of the city, there is no predominant social grouping on the basis of caste, religion or language.

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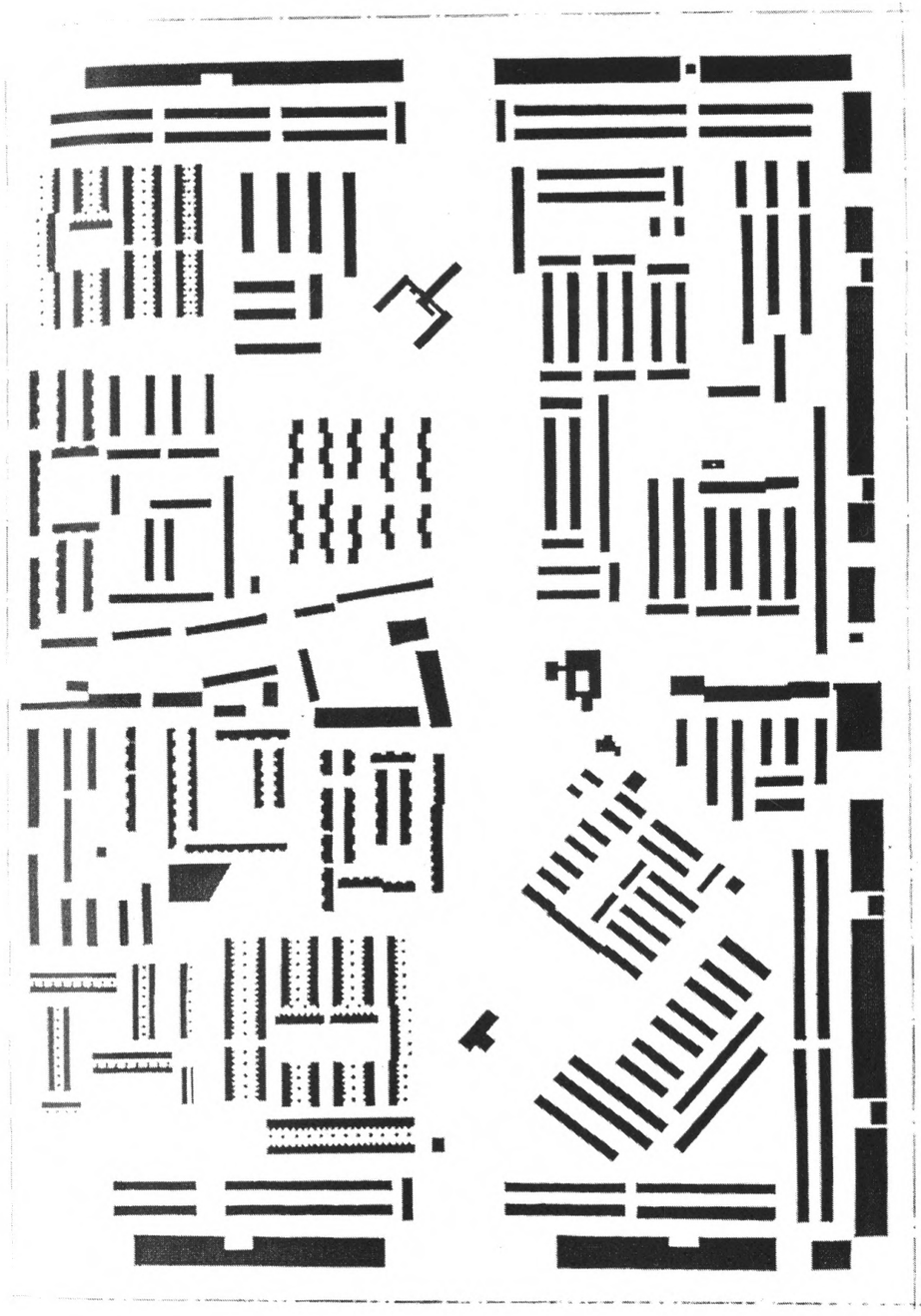
[158] *Ibid.*
[159] *Census of India, 1991.*



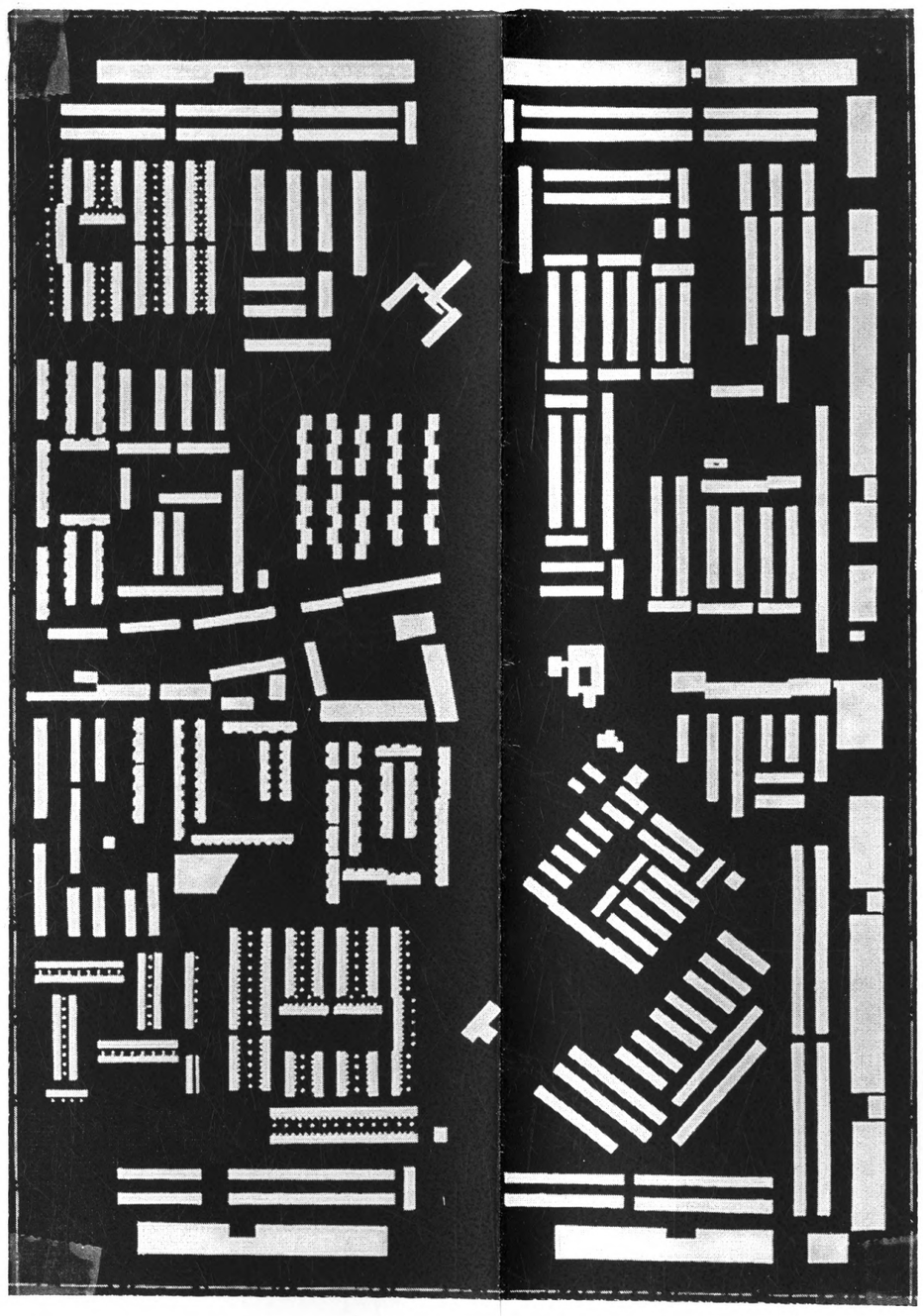


Plate 7.1 Figure/Ground Plans of Sector 22.

Sector 22 has commercial, educational, health care, recreational and religious facilities provided within the sector, making it a self-contained neighborhood unit. The spatial structure of the sector can, thus, be said to be dependent on the following four categories:

1. Housing
2. Commercial development
3. Open Spaces
4. Educational, health, religious and other essential services

1. HOUSING

Sector 22 is predominantly residential in nature. It has an equal mix of government and private residences. The plot size of residential units ranges from 5 *marlas* (125 sq. yards) to 1 *kanal* (500 sq. yards). The private and government housing in the sector are segregated by the central green strip. The private housing is to the east of the green belt and closer to the commercial development of the sector (Fig. 7.4). The government housing in the sector forms an interesting variety of several house types designed by Jane Drew, Maxwell Fry and Pierre Jeanneret, whereas the private housing, built within the frame controls, presents a comparatively monotonous picture.

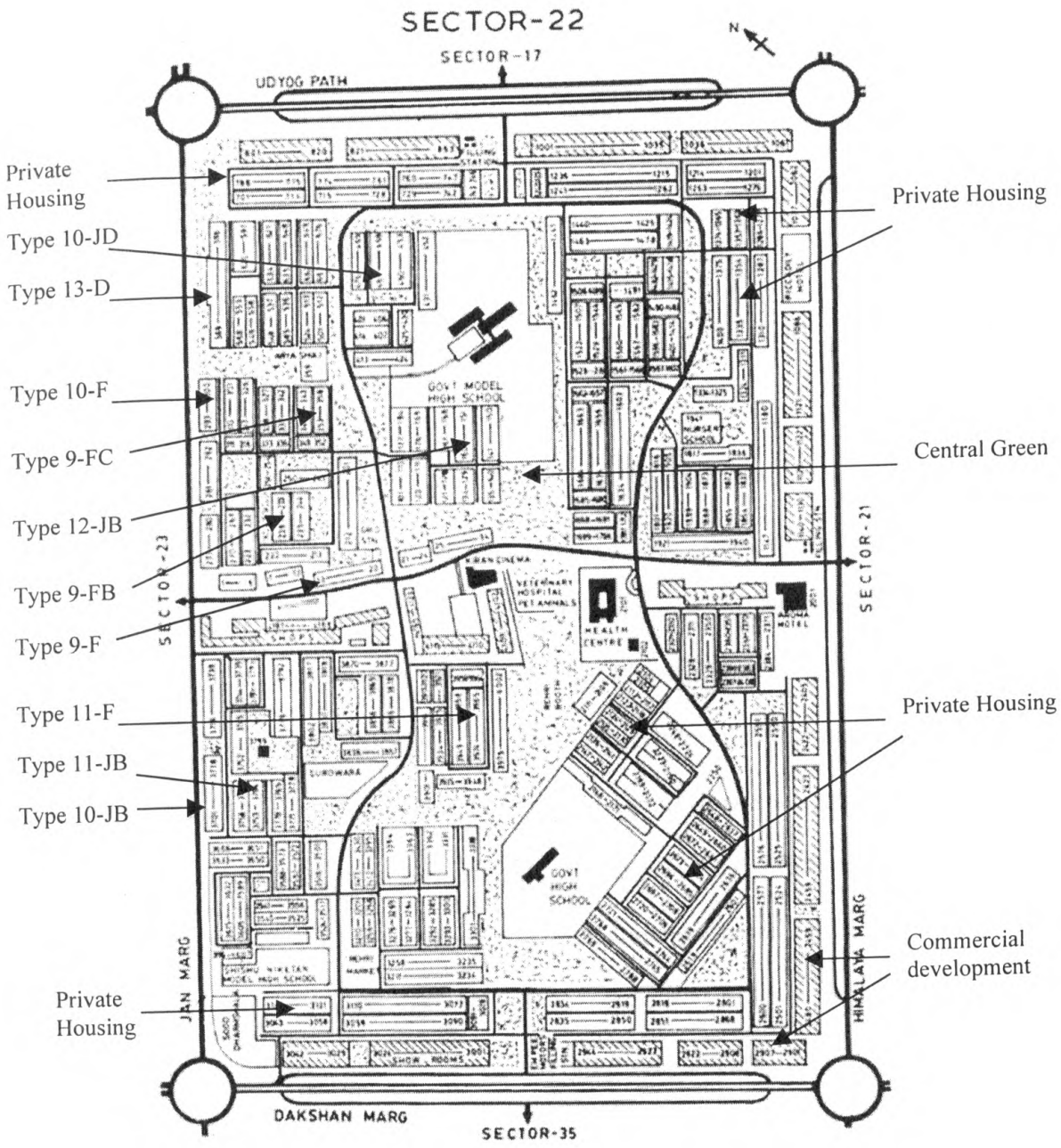


Fig. 7.4 Private and government housing in the sector are separated by the central green strip, which also houses the educational and health care facilities of the sector.

Government Housing

Sector 22 has various categories of government housing ranging from Type-9 to Type-13, with plot area ranging from 10 *marlas* to 5 *marlas* or less. Within these five categories, several variations were designed to provide a variety of housing in the sector.[160] The various house types in Sector 22 are:

1. Type 9-F, 9-FB and 9-FC

The Type-9 houses are grouped to the north of the V4 Shopping Street, with Type 9-F facing the shopping complex. The houses are mostly double-storeyed units in terrace formation. Terracing gives the upper floor access to a roof terrace while the ground floor has a rear courtyard to serve as private open space. Designed by Maxwell Fry, all three alternatives are very different in visual appearance. Whereas, Type 9-F (Plate 7.2) is in exposed brickwork, Type 9-FB (Plate 7.3) is completely plastered and painted white, and Type 9-FC (Plate 7.4) is in a combination of exposed brickwork and plastered surface. All three types use a variety of sun-shading devices to provide the facades with variety and detail. Type 9-F uses a large perforated precast concrete screen across the front façade whereas Type 9-FB uses egg-crate louvres. Type 9-FC houses, with the front façade facing north, did not need elaborate sun protection and are, thus, relatively plain in appearance.[161] The rear façade is exposed to the sun and is thus provided with deep recesses and verandahs. All three types use perforated precast concrete panels as balustrades to allow for the movement of air.

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[160] The various categories of housing designed by the architectural team in Sector 22 are designated by the house type followed by the designer's initials. For example, Type 11-JB means, a house of Type 11, alternate B, designed by Pierre Jeanneret. This system of designating house types is followed from the book: Joshi, Kiran. (1999). *Documenting Chandigarh.* Ahmedabad: Mapin Publishing Pvt. Ltd.

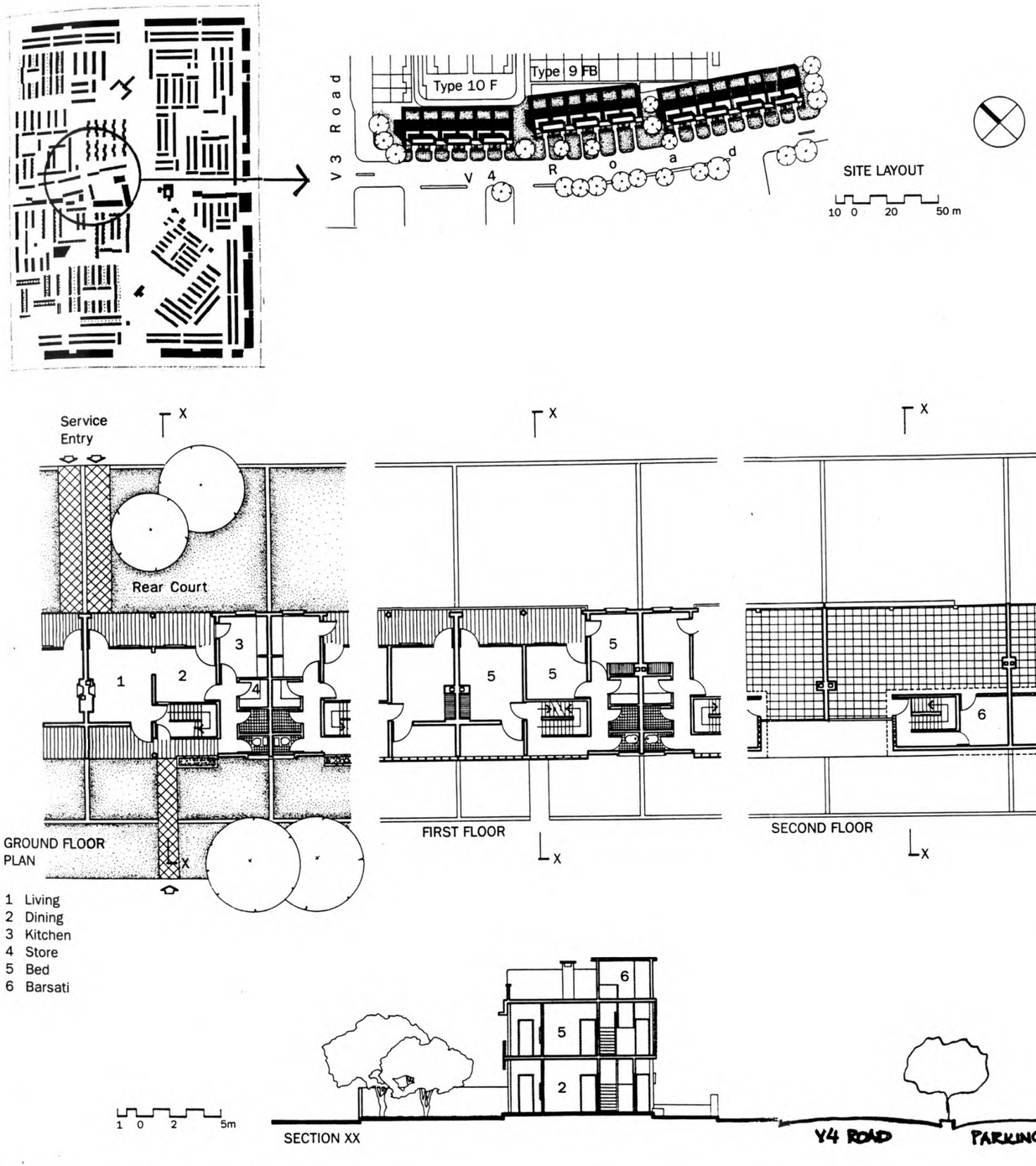
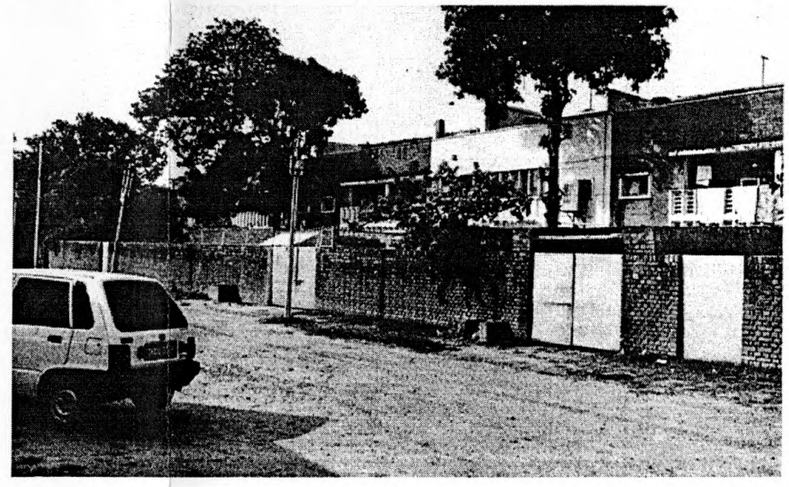
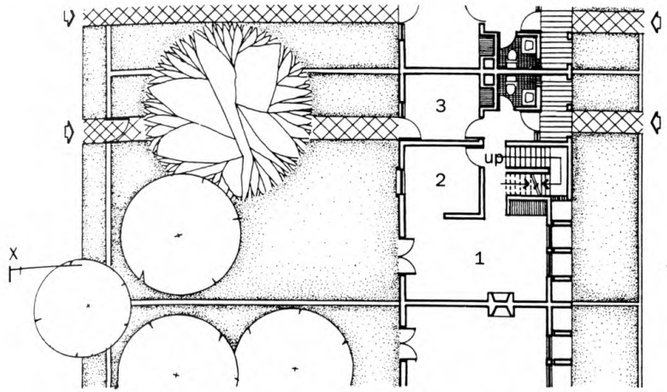


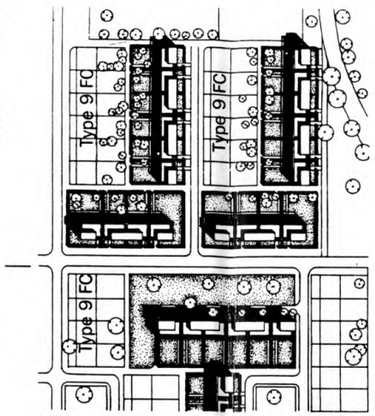
Plate 7.2 Type 9-F housing by Maxwell Fry.

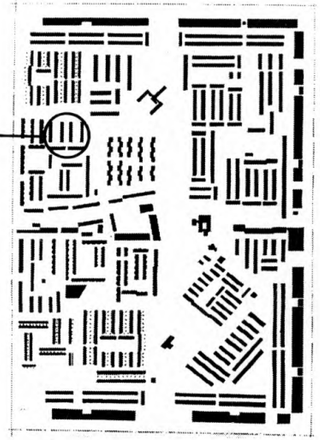


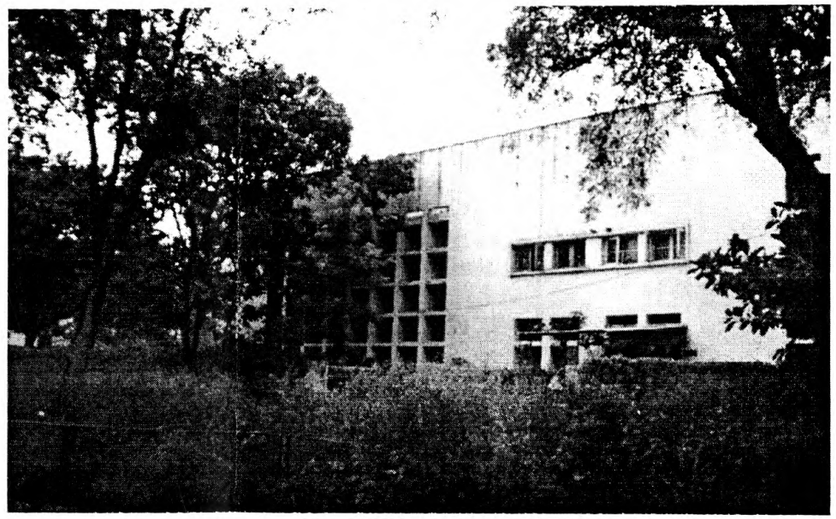
House Type 9-F
Sector 22, Chandigarh

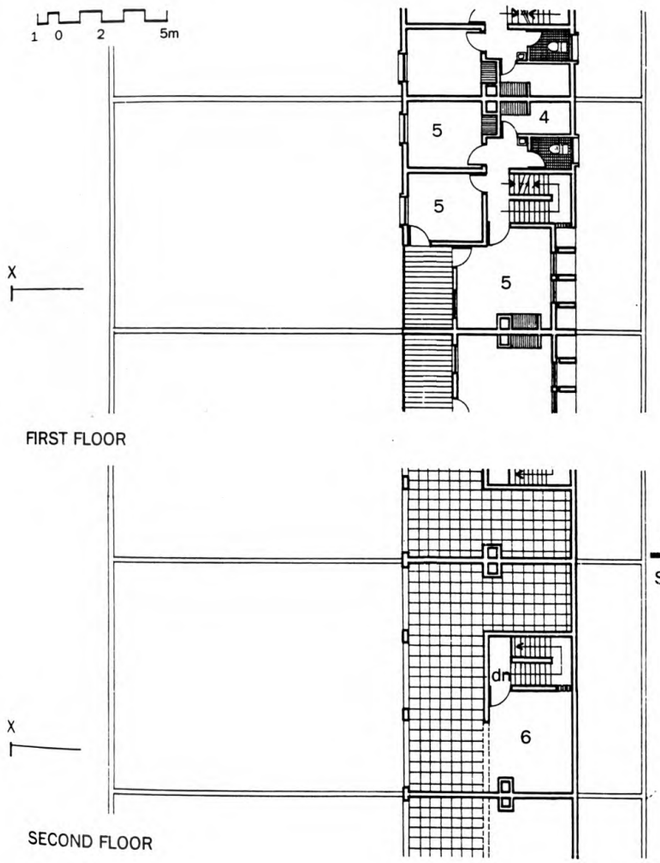
Plot Size: 34'-6" X 69'-0"	Total Plot Area: 2380.50 Sq. Ft.
Ground Coverage: 938.21 Sq. Ft.	Total Covered Area: 2156.80 Sq. Ft.
Percentage Ground Coverage: 39%	Floor Space Index: 0.91
No. of Floors: 2	











1 Living
2 Dining
3 Kitchen
4 Store
5 Bed
6 Barsati

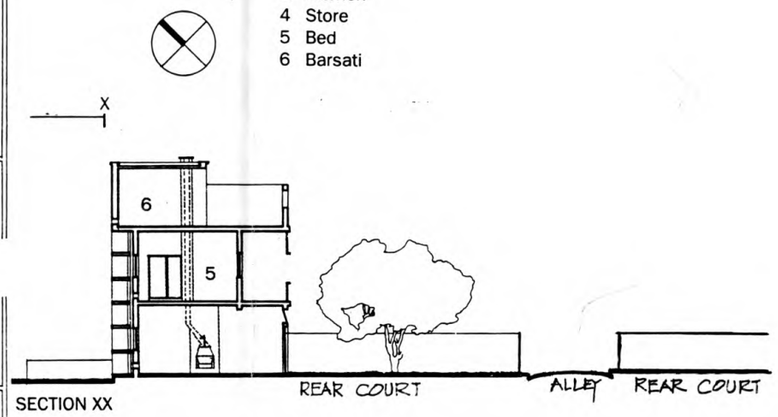
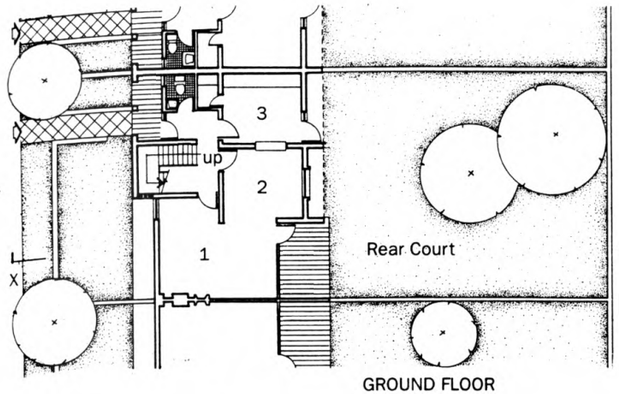


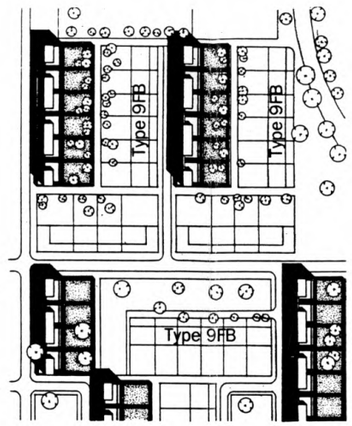
Plate 7.3 Type 9-FB housing by Maxwell Fry.

House Type 9-FB
Sector 22, Chandigarh

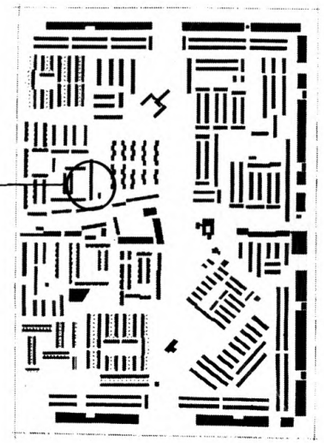
Plot Size: 34'-6" X 78'-9"	Total Plot Area: 2716.88 Sq. Ft.
Ground Coverage: 849.24 Sq. Ft.	Total Covered Area: 2062.44 Sq. Ft.
Percentage Ground Coverage: 31%	Floor Space Index: 0.76
No. of Floors: 2	

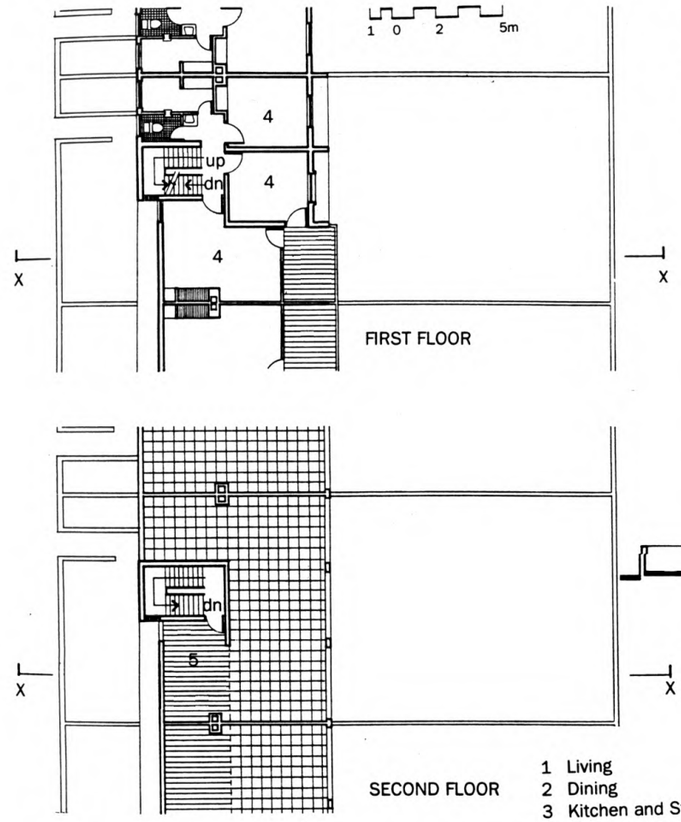


GROUND FLOOR

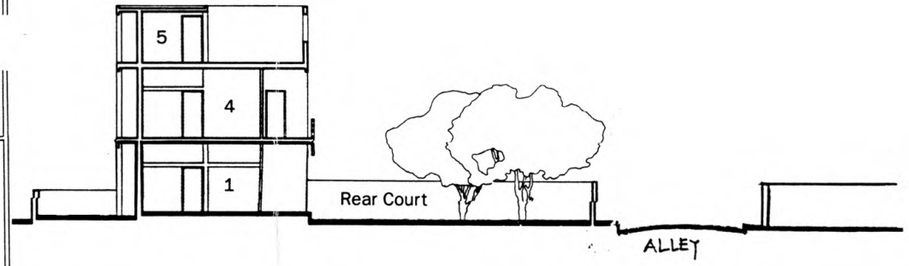


SITE LAYOUT (Sector 22)





FIRST FLOOR



SECOND FLOOR

1 Living
2 Dining
3 Kitchen and Store
4 Bed
5 Barsati

Plate 7.4 Type 9-FC housing by Maxwell Fry.

House Type 9-FC
Sector 22, Chandigarh

Plot Size: 34'-6" X 83'-6"	Total Plot Area: 2880.75 Sq. Ft.
Ground Coverage: 1019.09 Sq. Ft.	Total Covered Area: 2156.80 Sq. Ft.
Percentage Ground Coverage: 35%	Floor Space Index: 0.75
No. of Floors: 2	

The common family spaces (living and dining areas) and the kitchen, are on the ground floor and the bedrooms are on the second floor. Such an arrangement is very common in *haveli* type houses in traditional Indian cities, where the private living spaces are generally provided on the upper floors. The roof of the Type 9 houses has a sleeping terrace with a barsati to store portable beds. The houses have a deep rear courtyard for family activities. The average ground coverage is approximately 35 per cent, with substantial open areas at the front and rear of the plot. The houses do not have provision for a garage. Thus a common alteration is the addition of a temporary garage by roofing a part of the front courtyard. Apart from minor complaints such as pigeons nestling in the egg-crate louvres, the design of this category has proved to be satisfactory.

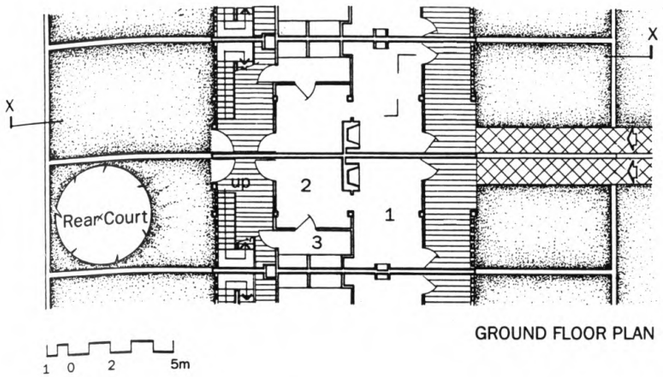
As far as their overall layout within the sector is concerned, they are arranged as row houses with service alleys at the back. The service alleys make the housing rows stand as separate entities, reducing social interaction between neighboring houses.

2. Type 10-JB, 10-JD and 10-F

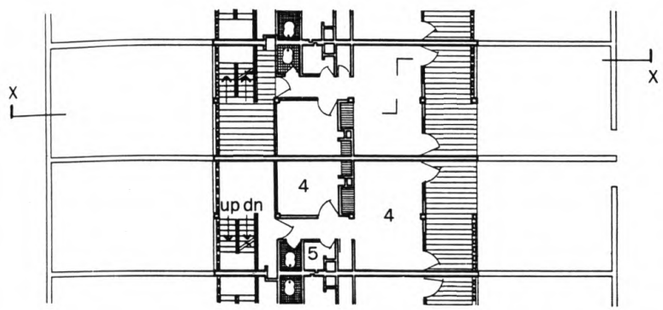
Type 10 category in Sector 22 consists of Type 10-JB and Type 10-JD houses designed by Jeanneret and Type 10-F designed by Fry. Though all three alternatives are in exposed brickwork, they each have a distinct visual appearance. Type 10-JB (Plate 7.5), designed by Jeanneret is in the form of duplex units in reinforced concrete frame construction with perforated brick screen infill. The housing unit has family space on the ground floor and bedrooms on the upper floor. The terrace, provided with a barsati, is shielded from public view by the use of a high parapet wall, which like the rest of the façade, is a perforated brick screen. The screens, although they provide interest and

variety to the façade, are found to be a nuisance by the residents, who in a lot of instances have blocked the perforations with bricks or mortar. The screens, intended to provide privacy, fail to serve such a purpose. The residents complain that the screens reduce privacy and also bring dust and refuse into the house.

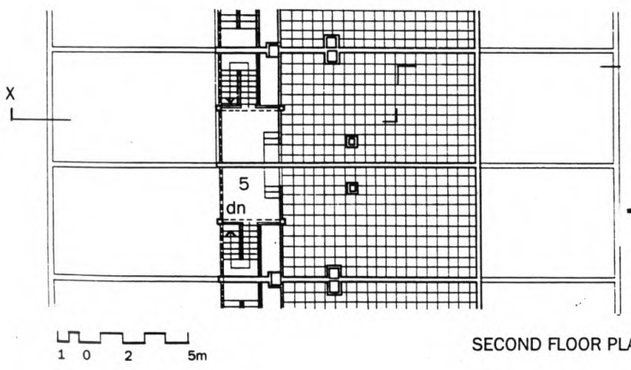
Type 10-JD (Plate 7.6) houses are single-storeyed, two bedroom units. The houses are finished in exposed brickwork. The façade of these houses is relatively plain and geometric. Concrete spouts are provided at regular intervals for water drainage from the roof. These spouts, along with the hovering roof plane, form a strong visual element. Conspicuous on the façade are several small window openings of different sizes, arranged randomly, much like the windows at Notre Dame du Haut at Ronchamp, by Le Corbusier. Rows of these houses are divided by slow-traffic, V6 roads that in many instances are still unpaved. The dividing road is narrow enough to permit interaction between neighbors who socialize in the relatively traffic free street or in the front courtyards of the houses. As in other house types, user intervention has led to several changes in the original structure. Additional living spaces have been created by enclosing verandahs with lightweight partitions. Parking spaces have been created by covering a part of the front courtyard with Asbestos Cement (A.C.) or Galvanized Iron (G.I.) sheets. Both the 10-JB and 10-JD house types by Jeanneret have a ground floor coverage of 47 per cent, which is higher than Type 9 houses, but still present the residents with ample open space.



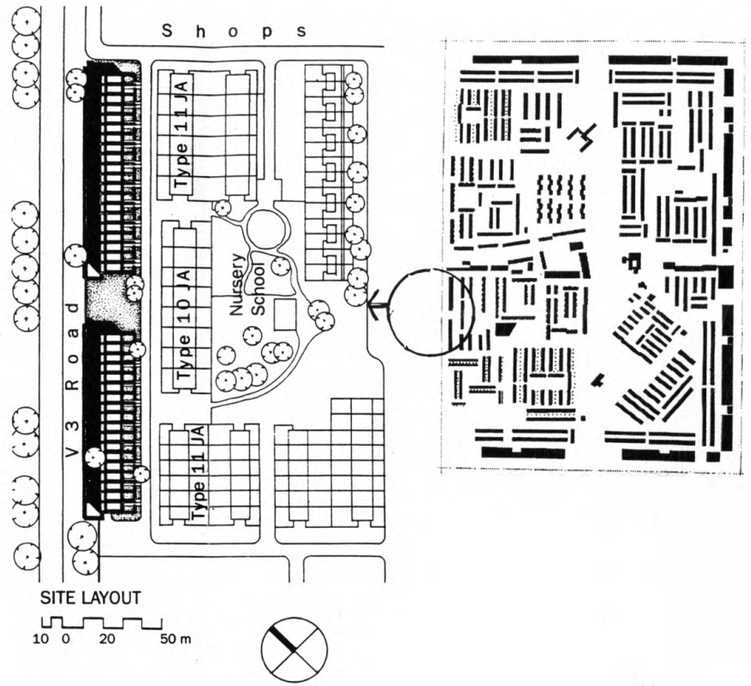
GROUND FLOOR PLAN



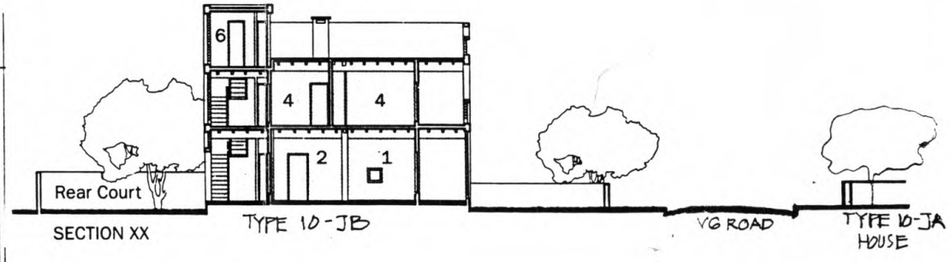
FIRST FLOOR PLAN

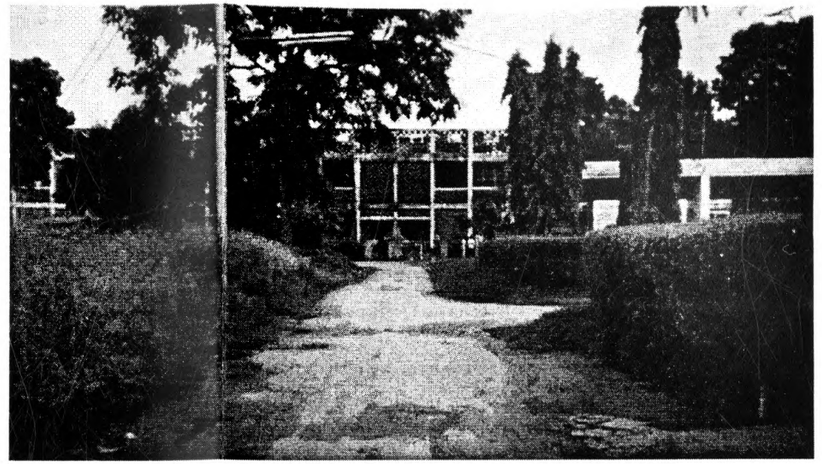


SECOND FLOOR PLAN



SITE LAYOUT





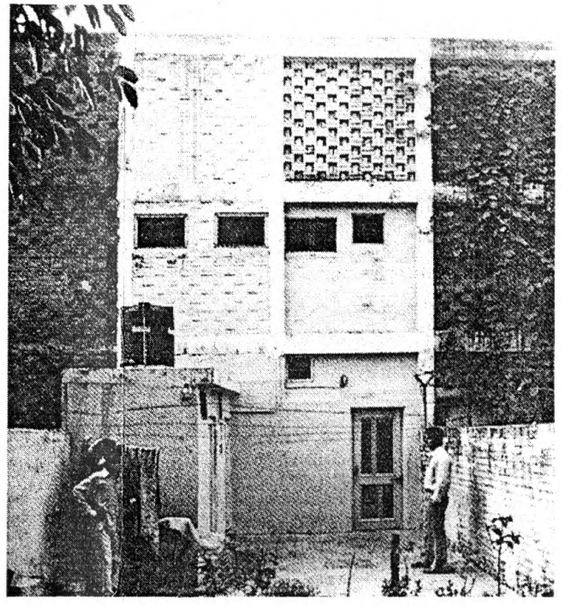
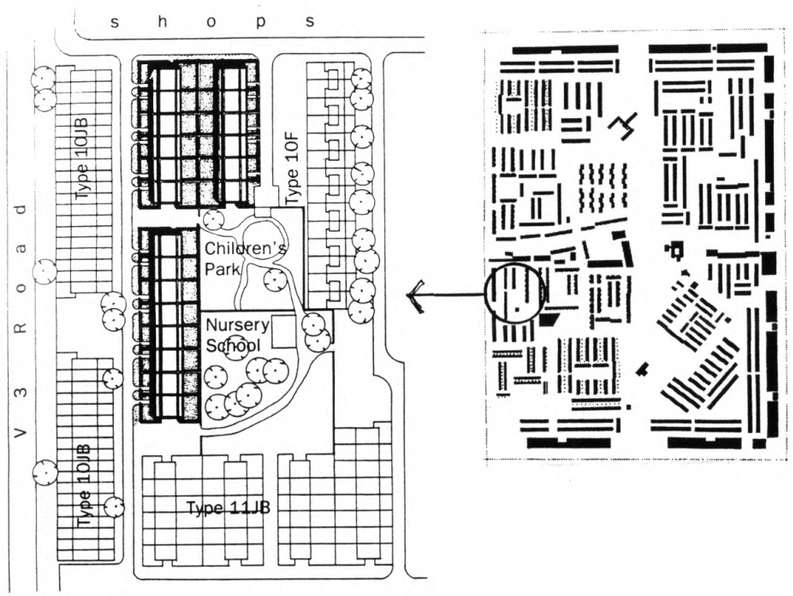


Plate 7.5 Type 10-JB housing by Pierre Jeanneret.

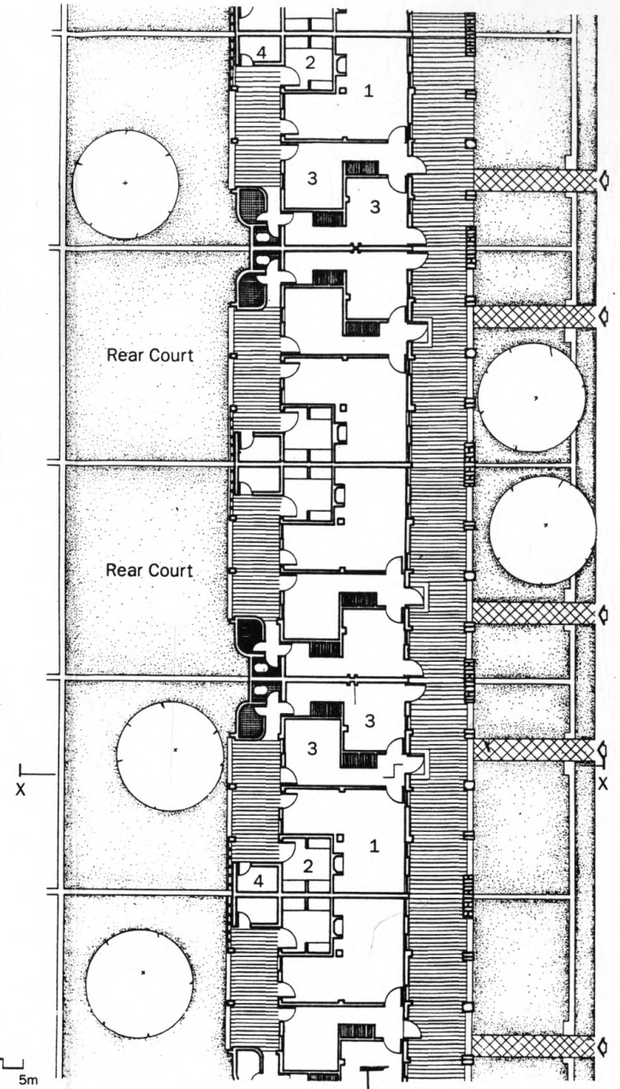
House Type 10-JB
Sector 22, Chandigarh

Plot Size: 17'-9" X 84'-6"	Total Plot Area: 1499.88 Sq. Ft.
Ground Coverage: 700.96Sq. Ft.	Total Covered Area: 1576.62 Sq. Ft.
Percentage Ground Coverage: 47%	Floor Space Index: 1.05
No. of Floors: 2	



SITE LAYOUT

10 0 20 50 m



1 Living-Dining
2 Kitchen
3 Bed
4 Store

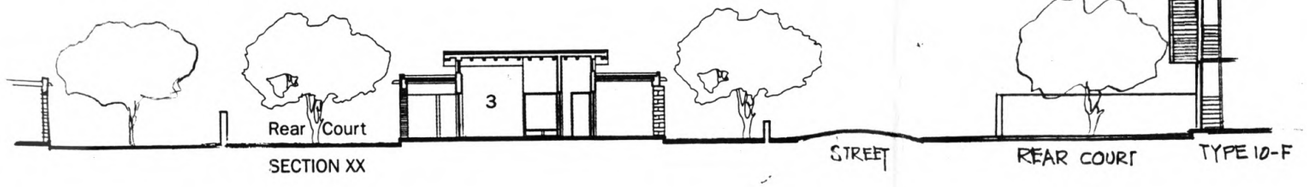
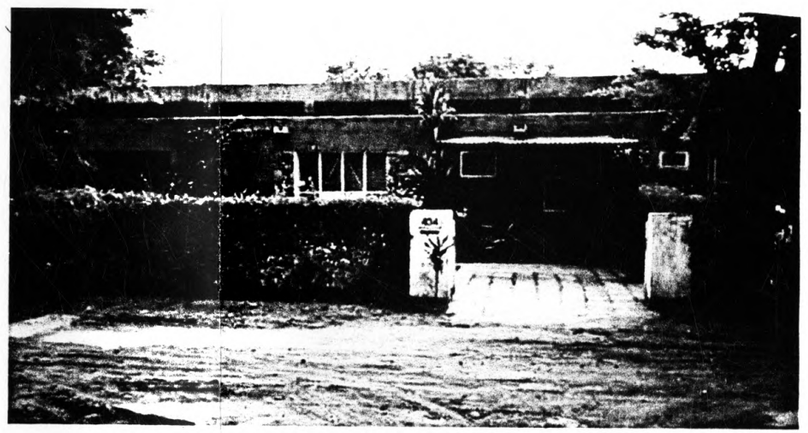
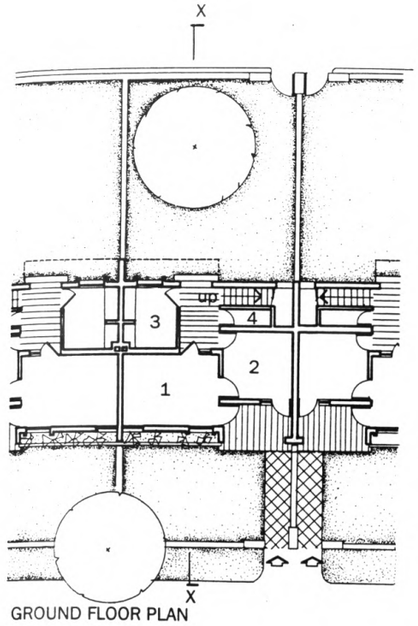


Plate 7.6 Type 10-JD housing by Pierre Jeanneret.

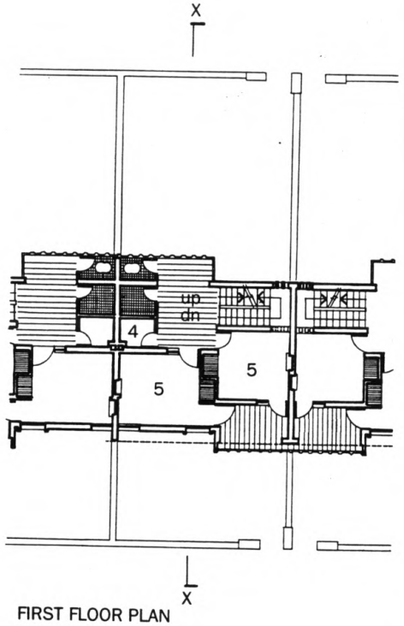


House Type 10-JD
Sector 22, Chandigarh

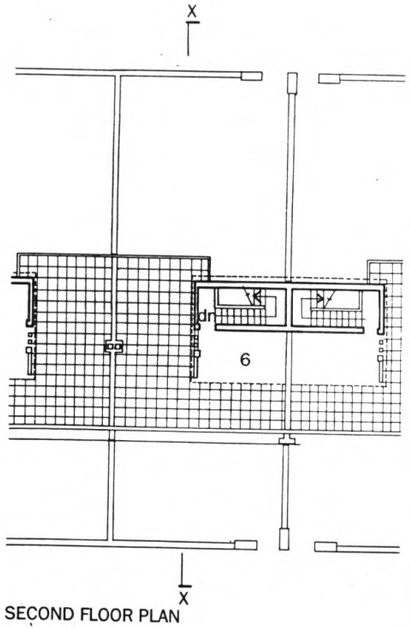
Plot Size: 31'-6" X 78'-9"	Total Plot Area: 2480.63 Sq. Ft.
Ground Coverage: 1180.20 Sq. Ft.	Total Covered Area: 1180.20Sq. Ft.
Percentage Ground Coverage: 48%	Floor Space Index: 0.48
No. of Floors: 1	



GROUND FLOOR PLAN

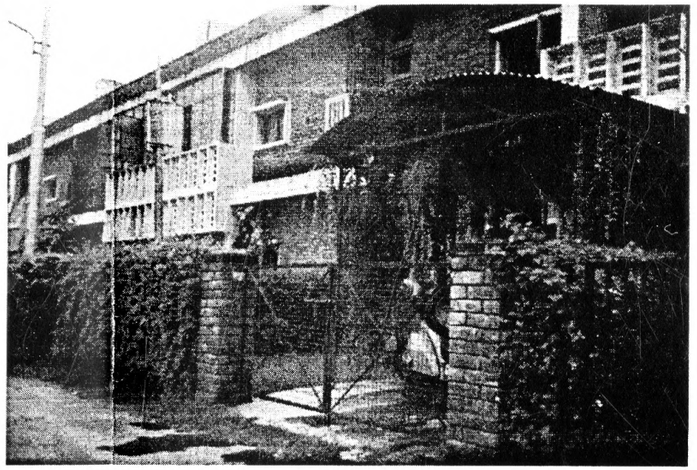


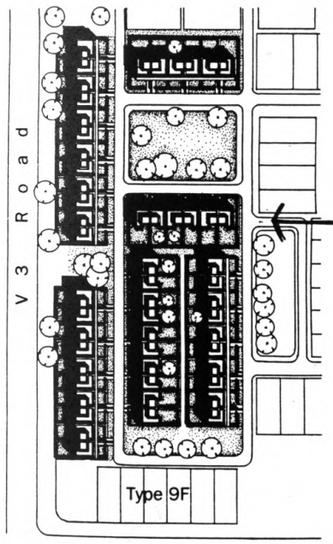
FIRST FLOOR PLAN

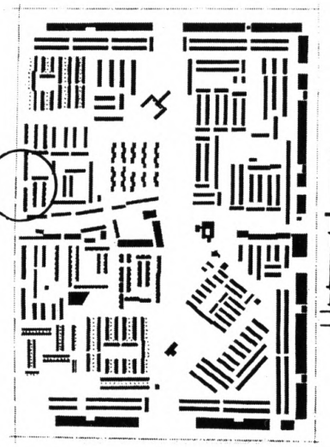


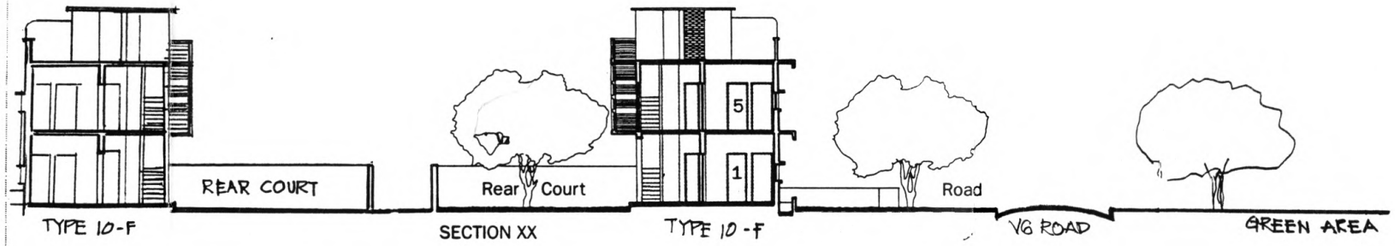
SECOND FLOOR PLAN

1 Living
2 Dining
3 Kitchen
4 Store
5 Bed
6 Barsati









SITE LAYOUT

10 0 20 50 m

Plate 7.7 Type 10-F housing by Maxwell Fry.

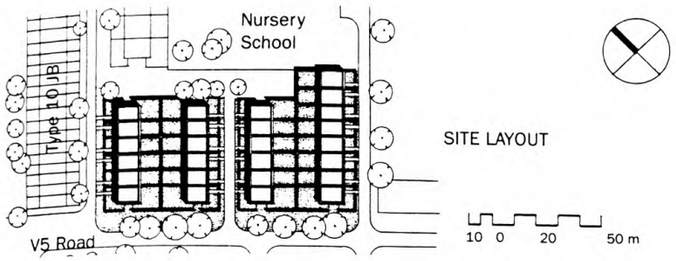
House Type 10-F
Sector 22, Chandigarh

Plot Size: 26'-3" X 71'-0"	Total Plot Area: 1863.75 Sq. Ft.
Ground Coverage: 647.04Sq. Ft.	Total Covered Area: 1585.25 Sq. Ft.
Percentage Ground Coverage: 35%	Floor Space Index: 0.85
No. of Floors: 2	

The third alternate, Type 10-F (Plate 7.7) houses by Maxwell Fry use a combination of exposed brickwork and reinforced concrete frame for the façade treatment, accented by the use of perforated precast concrete balustrades. The perforated balustrades permit the movement of air in the balcony spaces, which is very important in summer. Perforated screens inevitably appear in some form or the other in Maxwell Fry's design. These two-bedroom, duplex houses have ground coverage of around 35 per cent, a little less than that in Type 10 by Jeanneret. As in others house types, in several instances the balconies have been enclosed to get additional room and the front courtyard covered by roofing sheets to provide a shaded parking space.

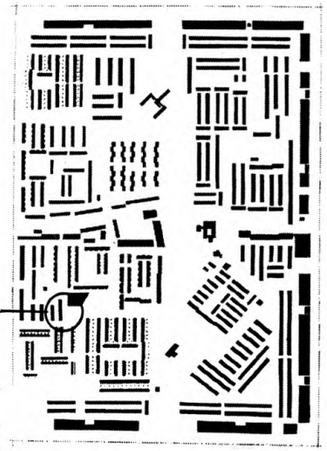
3. Type 11-JB and 11-F

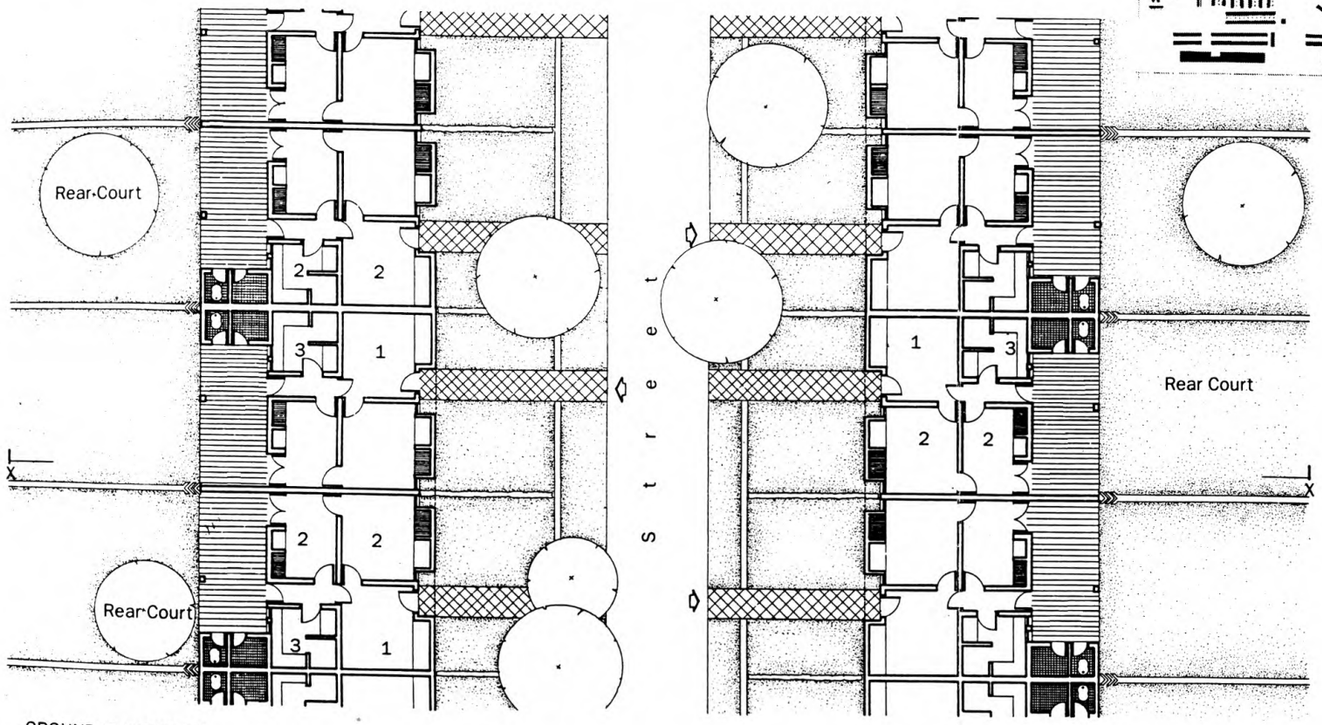
Type 11-JB (Plate 7.8), designed by Pierre Jeanneret, consists of two bedroom, single-storeyed houses. This house type uses a combination of exposed brickwork and plastered surfaces for the façade treatment. A pattern in projecting bricks not only improves the aesthetic appeal of the house, but also keeps the wall shaded. A part of the façade is in the form of a series of projections and recesses, with the projections housing storage closets. Such an arrangement also helps keep the interiors cool. Strip windows are provided in the recesses to bring in light. Concrete spouts, used to drain water from the roof, are used as visual elements on the façade. Visible intrusions by the users include construction of a temporary garage in the front and construction of semi-permanent rooms in the spacious rear courtyard. Ground coverage is only 42 per cent, which again proved to be low resulting in added construction by the residents.



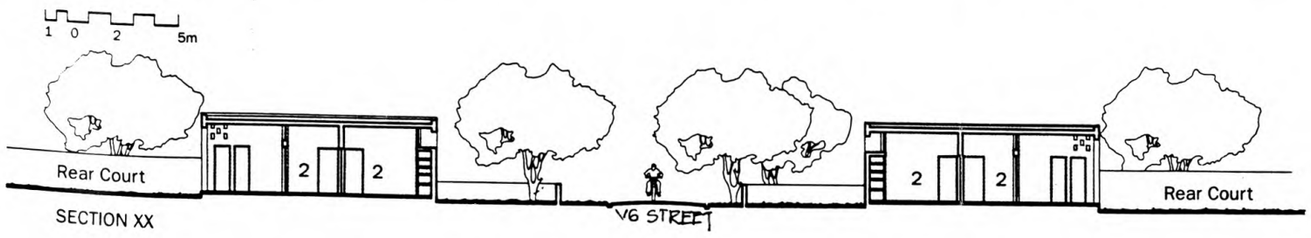
SITE LAYOUT

10 0 20 50 m



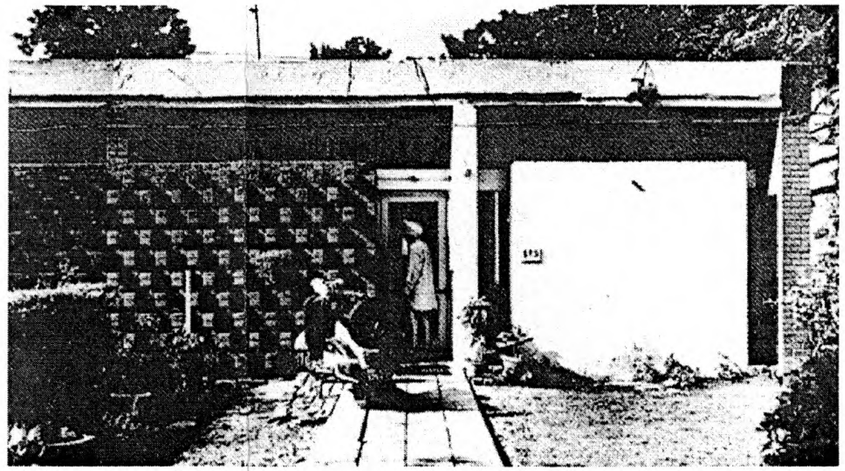


GROUND FLOOR PLAN



SECTION XX

Plate 7.8 Type 11-JB housing by Pierre Jeanneret.



House Type 11-JB
Sector 22, Chandigarh

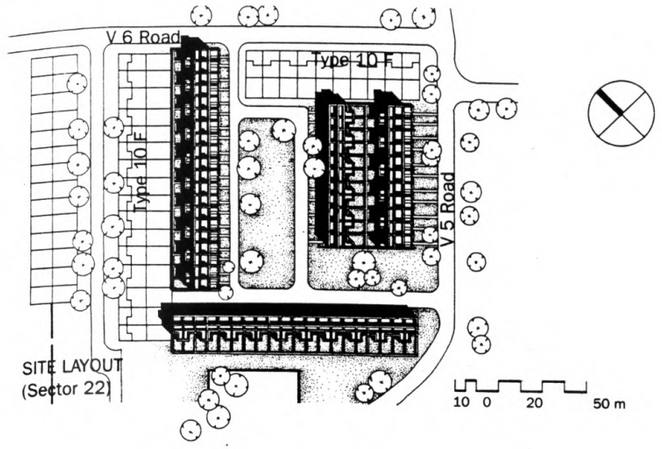
Plot Size: 26'-3" X 82'-0"	Total Plot Area: 2152.50 Sq. Ft.
Ground Coverage: 905.86 Sq. Ft.	Total Covered Area: 905.86 Sq. Ft.
Percentage Ground Coverage: 42%	Floor Space Index: 0.42
No. of Floors: 1	

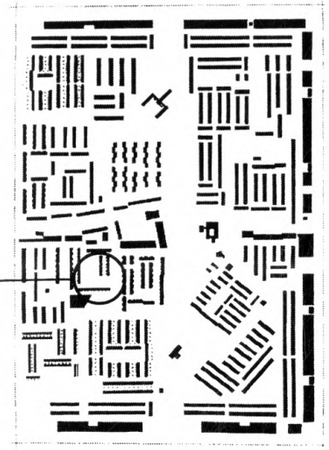
Type 11-F (Plate 7.9) houses by Maxwell Fry are two bedroom duplex units. The arrangement of rooms is similar to the other house types by Fry, with bedrooms on the first floor and common family spaces on the ground floor. All services were grouped in the rear with service lanes leading to them. One drawback is that there is no provision for toilets on the upper floor, causing inconvenience to the users.

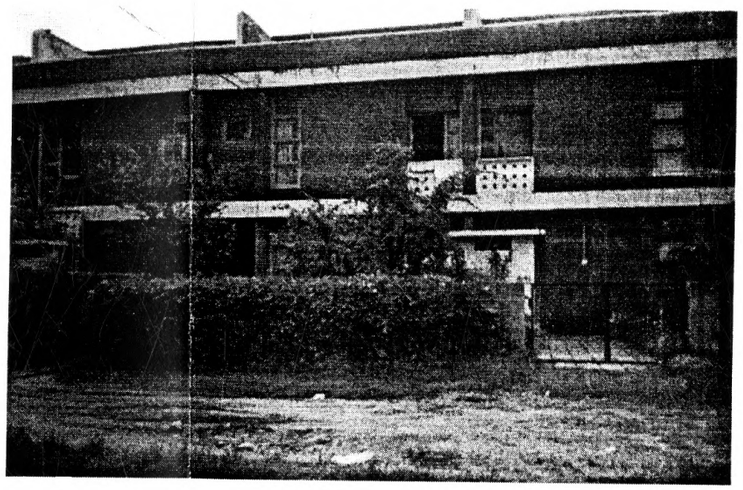
The front façade is very similar to those of Type 9 and Type 10 by Fry. It is characterized by a combination of exposed brickwork and concrete frame with precast perforated screens used as balustrades. The rear façade is complemented by projecting balconies and shaded verandahs, resulting in an interplay of positive and negative spaces. As in other house types, spacious rear courtyards are provided for family activities. Rows of these houses are joined together and to some extent form integrated social units where people interact with the neighbors.

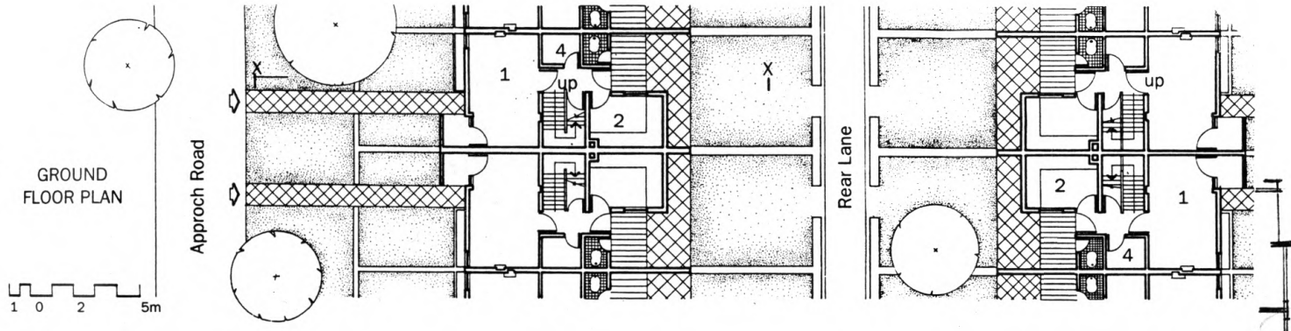
4. Type 12-JB

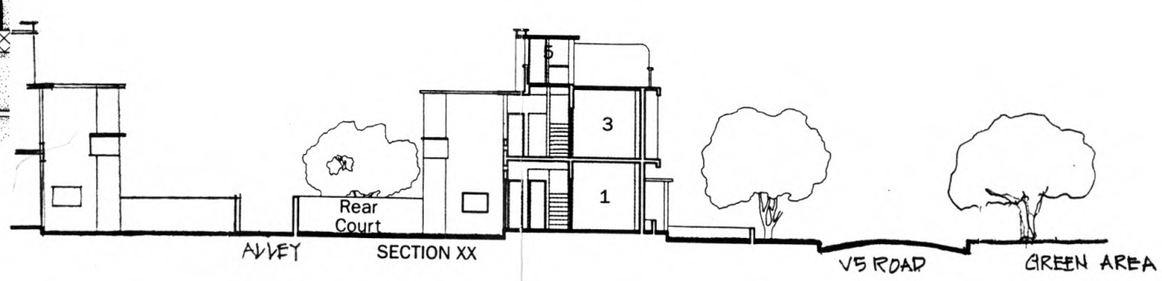
This category consists of single storeyed, two bedroom houses (Plate 7.10) arranged on plots that are staggered to form an interesting variation of continuous row-house type. In characteristically 'Jeanneret style', the facades are finished in a combination of exposed brickwork and plastered surfaces. To some extent they resemble Type 11-JB houses, except that the projecting brick pattern on the façade is substituted by perforated brick *jaali*. In several cases these brick *jaali,* have been blocked by the residents who find them impractical.

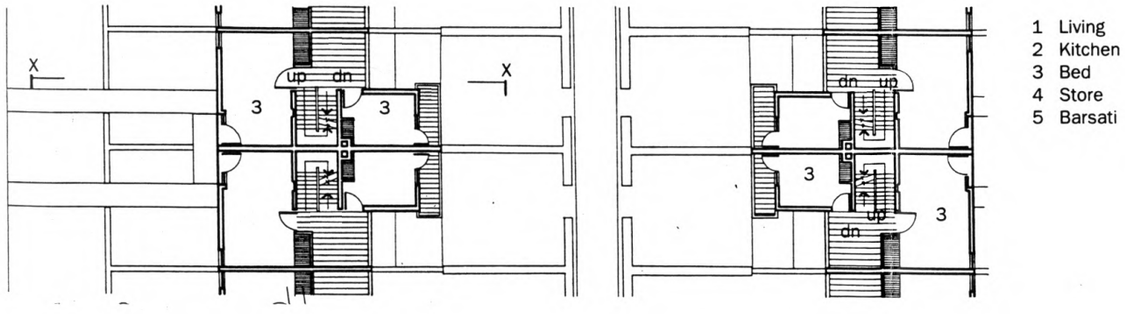










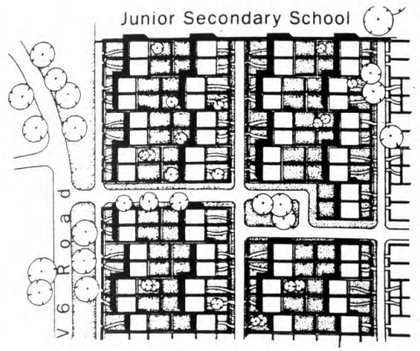


1 Living
2 Kitchen
3 Bed
4 Store
5 Barsati

Plate 7.9 Type 11-F housing by Maxwell Fry.

House Type 11-F
Sector 22, Chandigarh

Plot Size: 17'-9" X 69'-0"	Total Plot Area: 1224.75 Sq. Ft.
Ground Coverage: 524.10 Sq. Ft.	Total Covered Area: 1048.20 Sq. Ft.
Percentage Ground Coverage: 43%	Floor Space Index: 0.86
No. of Floors: 2	



SITE LAYOUT (Sector 22)

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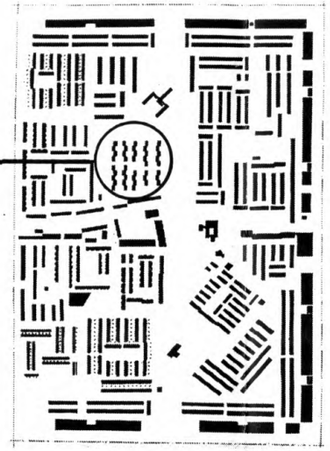
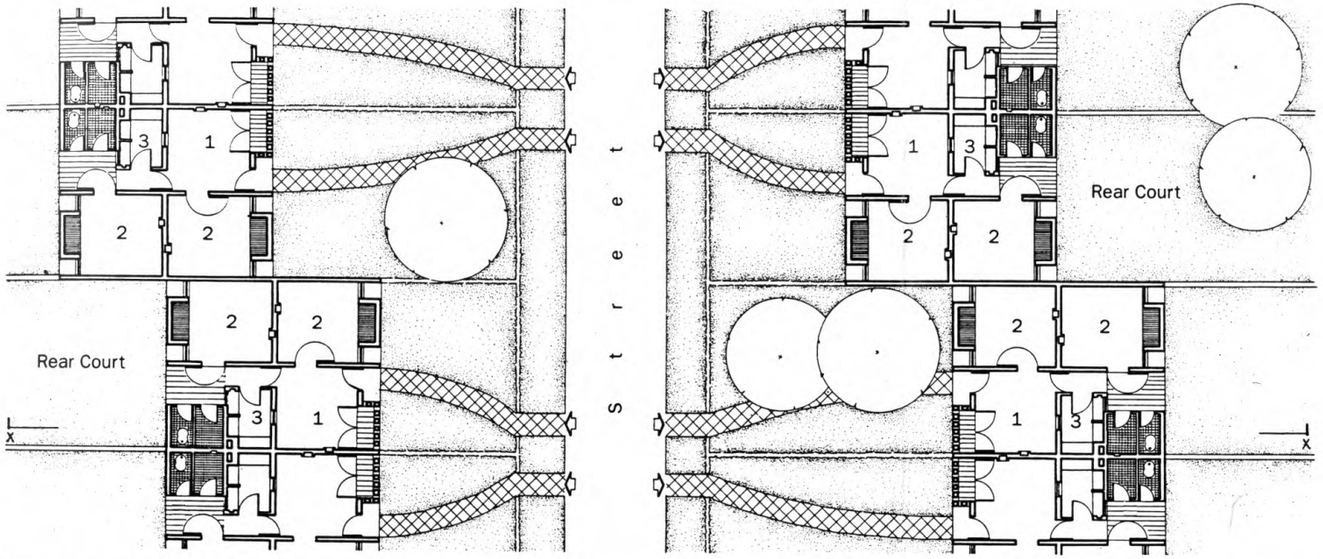
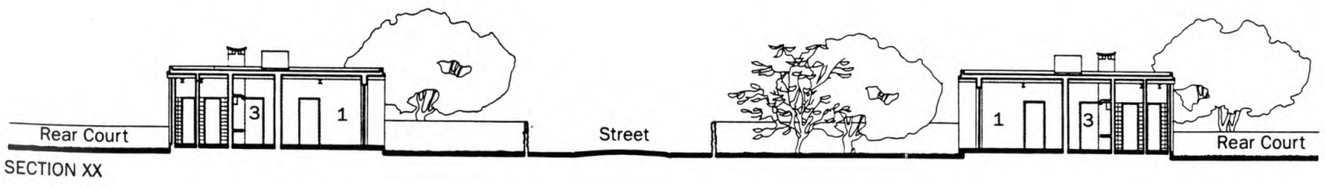


1 Living-Dining
2 Bed
3 Kitchen

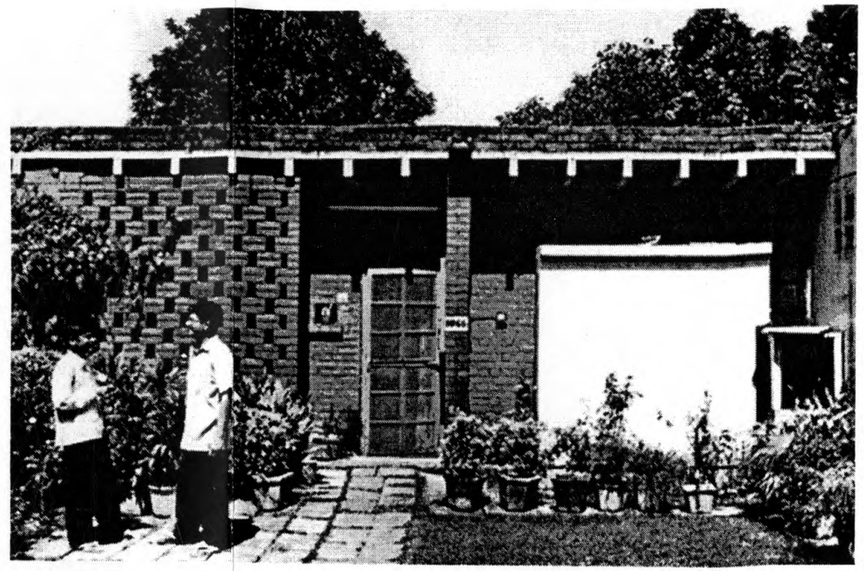


GROUND FLOOR PLAN



SECTION XX

Plate 7.10 Type 12-JB housing by Pierre Jeanneret.



House Type 12-JB
Sector 22, Chandigarh

Plot Size: 16'-6" X 68'-0"	Total Plot Area: 1122 Sq. Ft.
Ground Coverage: 350.63 Sq. Ft.	Total Covered Area: 350.63 Sq. Ft.
Percentage Ground Coverage: 31.25%	Floor Space Index: 0.31
No. of Floors: 1	

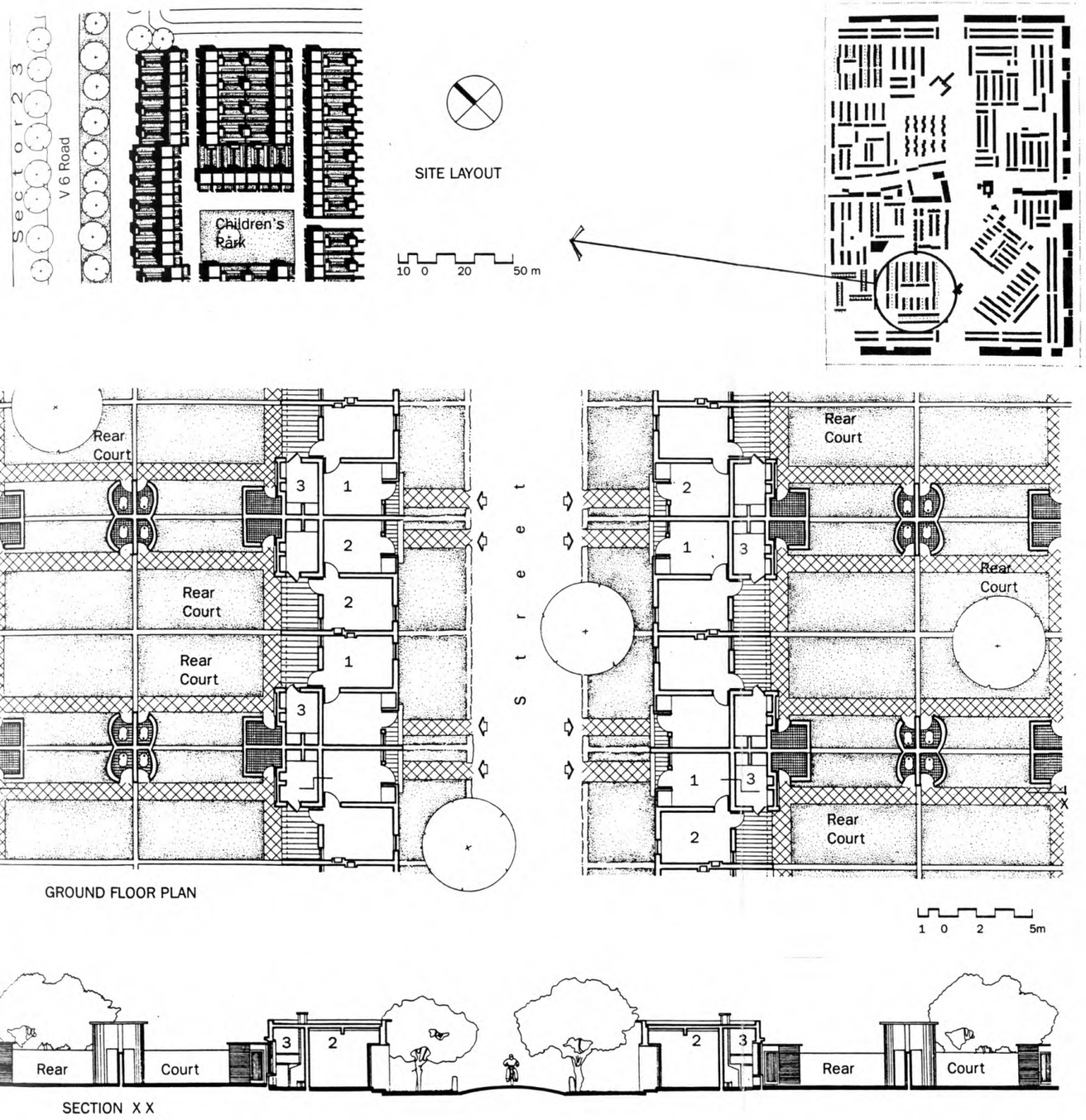
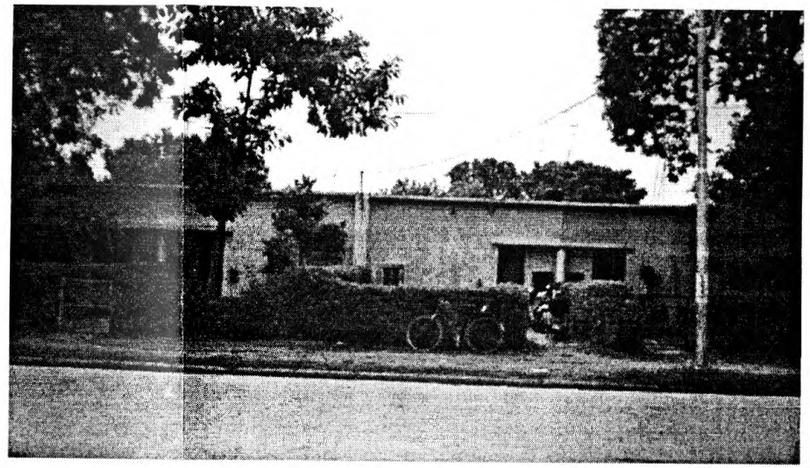


Plate 7.11 Type 13-D housing by Jane Drew.



House Type 13-D
Sector 22, Chandigarh

Plot Size: 19'-6" X 59'-0"	Total Plot Area: 1150.50 Sq. Ft.
Ground Coverage: 456.16Sq. Ft.	Total Covered Area: 456.16 Sq. Ft.
Percentage Ground Coverage: 40%	Floor Space Index: 0.40
No. of Floors: 1	

Several methods were used to achieve economy in construction. Some of them are the use of batten- and-tile roofs supported on load bearing walls at equal intervals, provision of cement floors and clustering service areas of adjoining houses.[162] Rows of these houses are separated by narrow streets that form social spaces where children play and neighbors interact. Again, due to lack of covered space, several residents have constructed extra rooms in the rear courtyard.

5. Type 13-D

Type 13 formed the lowest category of government housing in the city in the first phase, until Type-14 was added later on the insistence of Jane Drew. Type 13-D in Sector 22 consists of intimately scaled houses, designed as row housing sited along short cul-de-sac streets that are narrow enough to permit interaction with the neighbors. The housing (Plate 7.11) is structured as a village community with central community spaces. In plan, each unit has two bedrooms, a kitchen fronting a verandah and toilet facilities provided at the rear end of the plot. Such a segregation of toilet space is common in traditional houses, but is not very practical in Chandigarh where low boundary walls hinder privacy. Also the absence of a covered walkway leading to the toilet makes their use difficult in rainy weather. The ground coverage in these houses is low, only 40 percent. There is almost a complete absence of common family space inside the house. This has led to the construction of extra rooms in the rear courtyard. External surfaces are plastered, which due to lack of maintenance, present an unkempt look. Considering the steep rise in the cost of land in Chandigarh, these 1000sq.ft. houses have become too expensive for the

[162] Joshi, p. 1 [illegible] 116

lowest class of government workers to afford. Though originally designed for peons and sweepers, they are today occupied by relatively higher ranked government employees.

Private Housing

The private housing in Sector 22 is concentrated in the eastern half of the sector. The majority of the private housing in Sector 22 is on small size plots ranging from 5 *marlas* to 1 *kanal*. As discussed previously, housing plots with area less than 10 *marlas* have to conform to strict frame controls. The frame controls require the construction of a mandatory two- storeyed frame (Fig. 7.5) to be built on the front façade of the house. The vertical frame, finished in plaster, projects 18 inches from the façade and is joined by a top course specified in the control sheets. No part of the house can project beyond this frame. The houses are to be built in terrace formation to provide each floor with ample open areas in the form of either courtyards or terraces. The Chandigarh Administration provides frame control sheets for different plot sizes, specifying the mandatory construction. These sheets also give information on permissible sectional heights (Fig.7.6), standard sizes for door and window openings and front, back and side setbacks (Fig. 7.7). No construction is allowed within these setbacks. The setbacks are an important part of the frame controls, ensuring adequate open spaces both at the front and the rear of the plot. The controls also specify the height of the boundary wall and the entrance gate (Fig. 7.8). The height of the boundary wall at the front generally varies between 2'-51/2" to 3'-81/2" and 5'-111/2", which is very low for people used to enclosed private spaces. In most houses, residents have put iron fencing or hedges over the low walls to ensure additional privacy and security (Fig.7.9). Columnar trees such as

pilyathia longifolia (common name: *ashoka* tree) and tall bushes are also used to screen the front courtyards.

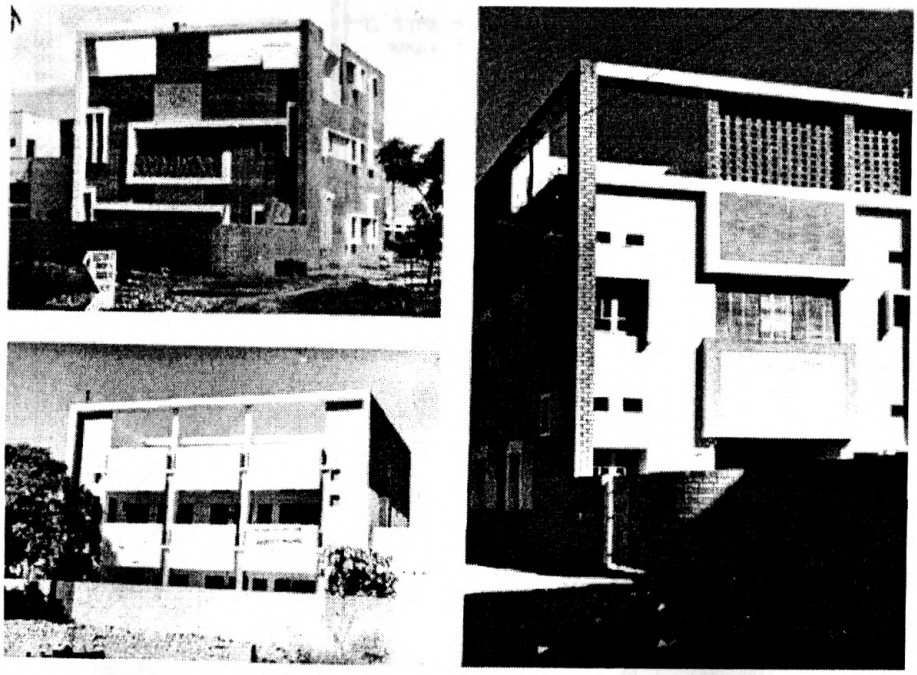


Fig. 7.5 The mandatory frame in *marla* houses. No construction can project beyond this frame.

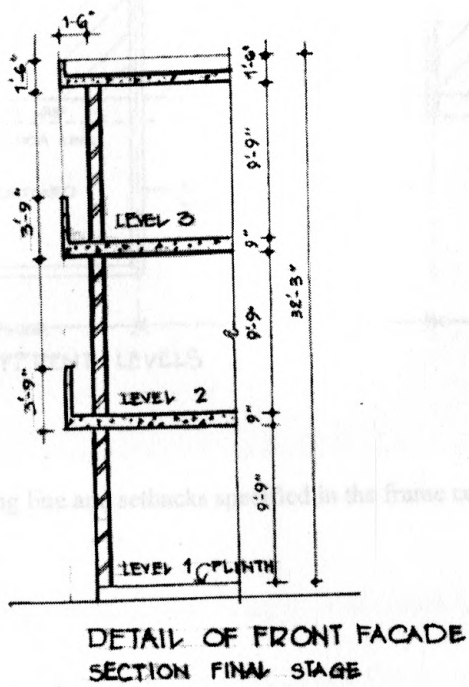


Fig. 7.6 Permissible section heights and front façade detail according to the frame control sheets.

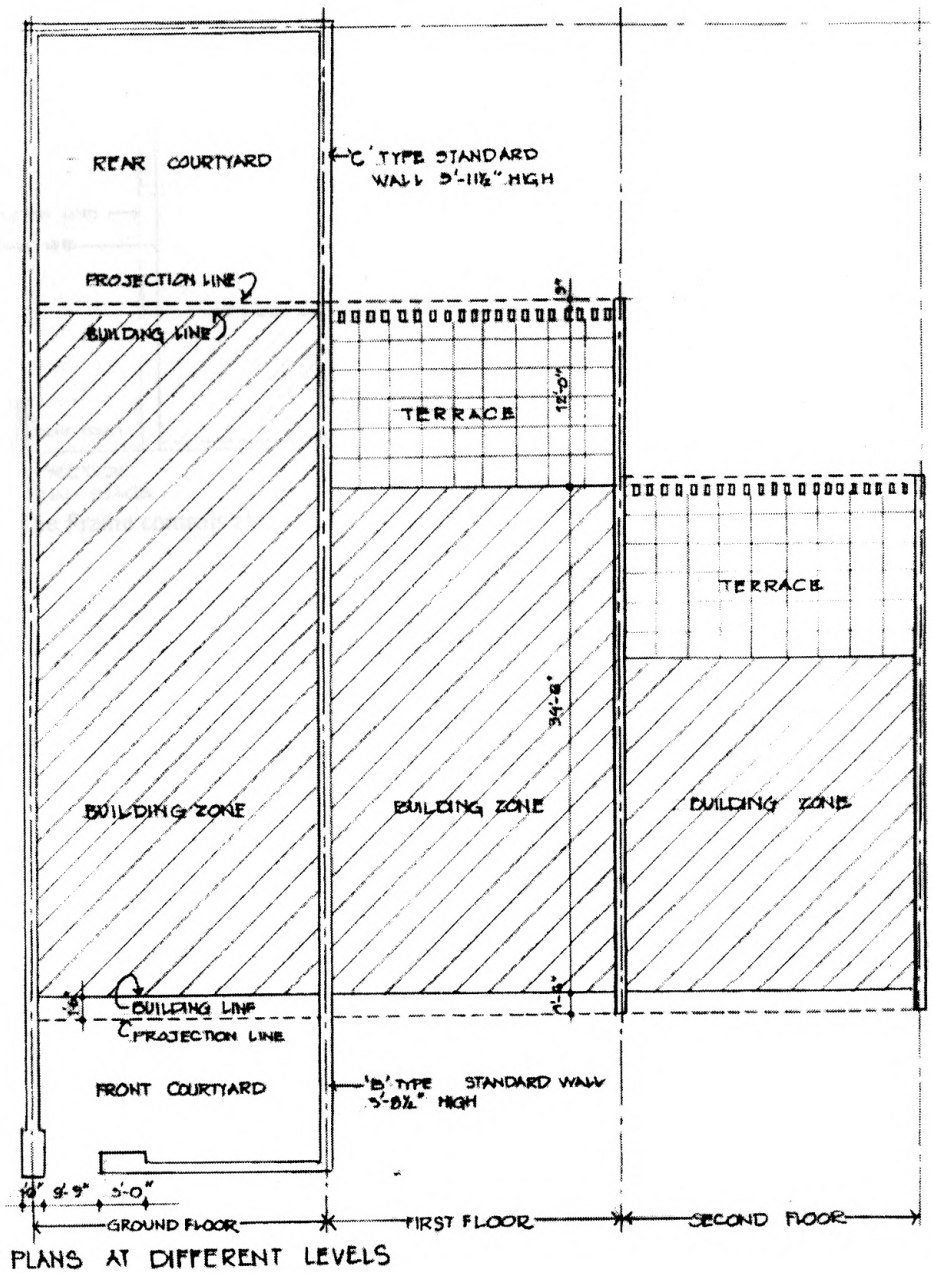


Fig. 7.7 Building line and setbacks specified in the frame controls.

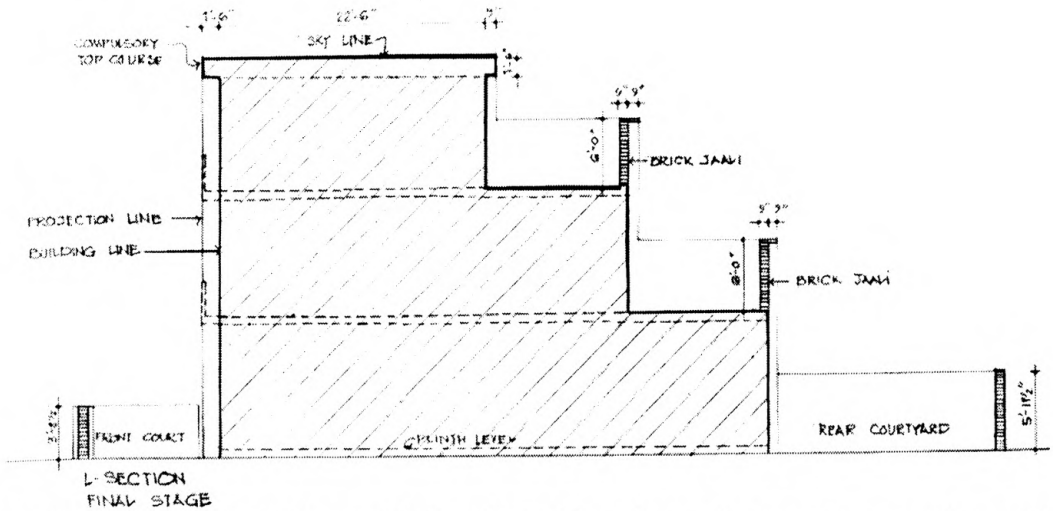


Fig. 7.8 The Frame controls also specify the heights of boundary walls, entrance gates and parapet *jaalis*.

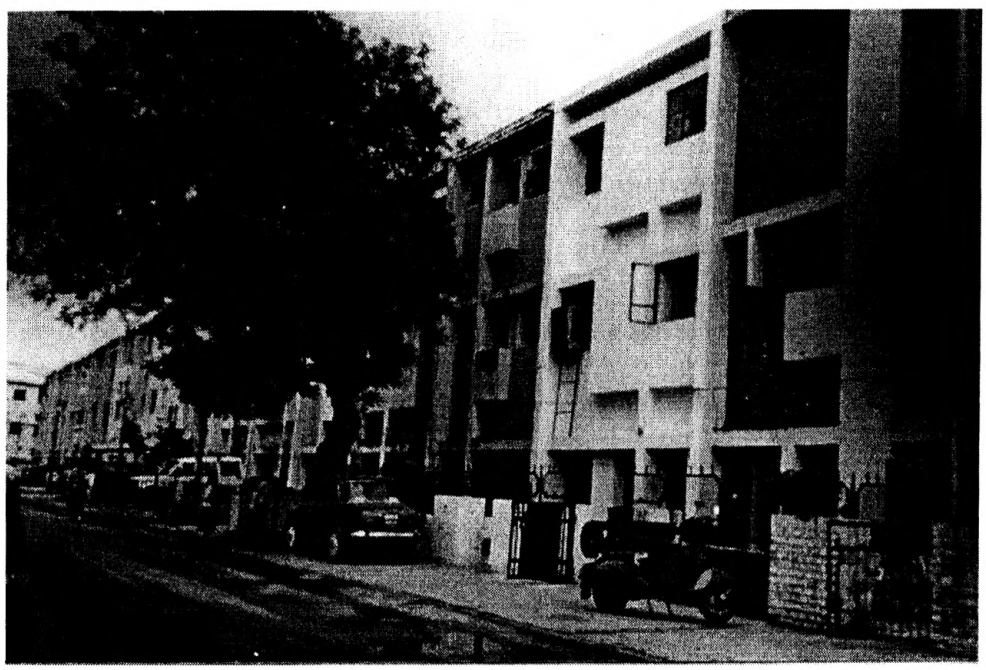


Fig. 7.9 Iron fencing has been added on the low height boundary wall for security.

The interior layout of houses is up to individual house owners, who need to follow the minimum standards set in the Capital Development Act, 1952. These include the restriction of the minimum size of habitable room (excluding kitchen) to 9.3 sq.mts.

(102 sq.ft) with a minimum width of 2.2 meters (7'-3") and a height not less than 2.75 meters (9 feet).[163] Other specifications include the provision of at least one or more openings in the wall of every habitable room for the admission of air and light, the aggregate area of which cannot be less than one tenth of the floor area. To avoid overcrowding, a maximum of two families were allowed on each plot. But due to the rapid growth of the population in Chandigarh, these two family dwellings are today occupied by a minimum of three or more families. Land use is specified for all plots in the city. There is a prohibition on the, "erection of shops, workshops, ware-houses, factories or buildings designed for particular purposes in any [residential] locality."[164] Despite such a restriction in favor of single land use, commercial activity is carried out from several private residences due to the increased cost of commercial land. Thus, not all rules and regulations are enforced. Such a breach of rules by a substantial number of people is one of the pressing concerns of the city administration. According to M.N. Sharma, one of the Indian architects assisting Le Corbusier's design team, the biggest challenge for the city is, "to revise the architectural controls to meet the changing socio-economic conditions and current needs of people and enforcement of existing regulations."[165]

Aesthetically, the private houses in the sector present a somewhat dull and monotonous appearance due to a lack of ingenuity in designing within the constraints of the frame controls. While, the controls ensure a uniform cornice line and a uniform building line, they have resulted in stereotypical houses with little variation in aesthetic

[163] Chawla, Baljit Singh. (1997). *The Capital of Punjab Development and Regulation Act, 1952.* Chandigarh: Chawla Publications (P) Ltd. p.36.
[164] *Ibid.*, p.7.
[165] Excerpt from the author's discussion with Architect M.N. Sharma on July 27, 1998, in Chandigarh.

treatment (Fig. 7.10). Despite the mandatory standards, internal spaces are cramped, in order to house more people than recommended. External facades are mostly in brick, which is usually painted in different colors. As in government housing, there are several intrusions into the open areas, most of them being covered parking spaces or enclosed balconies and verandahs.

Fig. 7.10 Rows of houses present stereotype façade due to impositions by the frame controls.

Within the housing blocks, plots are arranged in rows. In some cases, the plots are arranged back-to-back while some have service alleys in the rear. The housing blocks, in general, lack usable social spaces. The green areas interspersed with housing are, in most instances, either awkwardly sited or are ill maintained, reducing their use. The most frequent social interaction in the small sized plots occurs in the front courtyard and the street. Socializing on the streets is hazardous today considering the increase in high-speed vehicular traffic within the sector. The residents complain of the lack of privacy, which is

one of the most important elements shaping the traditional architecture of the region. The front and rear courtyards, exposed to public view (Fig. 7.11) hardly compare to the internal courtyards common in traditional houses.

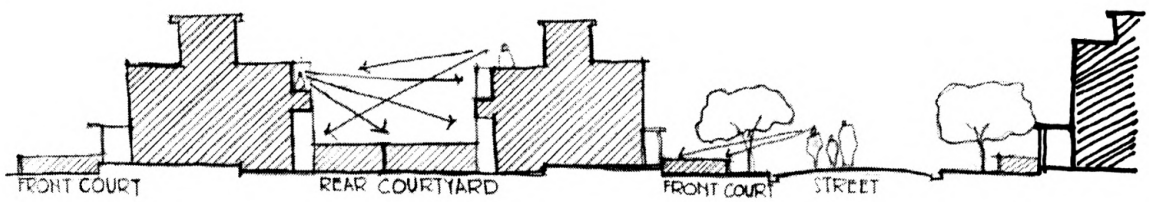


Fig. 7.11 Both the front and rear courtyard are exposed to public view, thus invading privacy.

In general, the private housing in Sector 22 lacks the diversity and vitality of the government housing by the architectural team. Most of the houses look alike and many of them are a pastiche of elements copied from the houses by Drew, Fry and Jeanneret.

Conclusions of the housing study

The purpose of this description is to understand the planning, aesthetic character and socio-cultural characteristics of the housing designed by the architectural team. This will enable a comparison of the housing in Chandigarh with that in traditional cities. The purpose is also to identify the aspects of housing design and sector layout in Chandigarh that do not work.

From a description of the government housing in Chandigarh, it is clear that the housing has undergone several changes. Though some of those changes are a result of the population growth and increasing land cost, many of them are due to lack of understanding of the social and cultural values of the local population. These

shortcomings are reflected in changes such as the blocking of *jaalis* and the addition of extra rooms in the courtyards and balconies, spaces that could not be optimally used. The addition of extra rooms can also be attributed to the increasing affluence of the urban population whose space demands have simultaneously increased.

In traditional Indian cities, privacy is one of the most important elements in the design of exterior as well as interior spaces in houses. In the *havelis*, there is a clearly defined hierarchy between private and public spaces, with a transition space formed by the threshold or *deori*. The family open spaces are clearly private spaces, with no intrusion from either the neighbors or the passers-by. In the design of the housing in Chandigarh, there is abundant open space within the housing plot, but both the front and rear courtyard do not afford sufficient privacy, inhibiting the use of these spaces. In Chandigarh, the front courtyard, in effect, forms the transition space, while the rear courtyard is exposed to view from adjoining houses

The second important factor in the design of houses in India is the desire for proximity to neighbors. In the housing in Chandigarh, such a need is met by providing low boundary walls and common party walls. The streets are sufficiently narrow in the case of lower income category housing, permitting interaction between neighbors. While such an arrangement was a commendable effort, it is not fully workable because of the high speed of traffic on the V6 roads outside the houses. Despite such a traffic hazard, people were observed interacting on the streets in several housing blocks, especially, the Type11, 12 and 13 house. The lack of traffic-free activity nodes, such as chowks, is felt in Chandigarh. The lack of interaction between neighbors in most sectors is one of the most serious problems in Chandigarh. But it is unfair to attribute such a problem entirely

to the design team. It is partly because of the changing socio-cultural conditions of the Indian society. In Chandigarh, more than half the population belonging to the working class, who commute far from their house to work, unlike traditional Indian cities, where the *haveli* had work space within it. Also, a growing amount of women in Chandigarh work outside the house as well. Thus, a substantial amount of the population spends more than half heir day outside the house. The evenings are devoted to a multitude of activities such as looking after the house and children, considering that domestic help is becoming more expensive and rare these days. The fast pace of life in the city leaves the average household with little free time to interact with the neighbors. Thus, the need for proximity to neighbors has lost some of its importance in the current scenario in a working-class city that Chandigarh is.

The next important aspect is the aesthetic appeal of the housing in Chandigarh. In traditional Indian cities, surface decoration forms an integral part in the overall image of the housing. The amount of embellishment is an indicator of social prestige. In the housing in Chandigarh, surface decoration was limited by budget constraints and a desire to present a unity in detail, which was one of Le Corbusier's persistent ideas. In the beginning there were no architectural controls for the private housing in Chandigarh but their haphazard development and low space standards causing concern to the designers as well as administrators. This led to the introduction of various types of controls to regulate the growth, the housing standard and aesthetic character of the built work. Instead of evolving and improving with time, these controls have continued in their original form, despite the urgent need to rethink them, not only to improve the aesthetic character of the city but also to allow for changes necessitated by organic growth.

The government housing in Sector 22 was not bound by frame controls, and thus presents an interesting variety, which was partially a result of the varied design styles of the architectural team of Jeanneret, Fry and Drew. From a description of the government housing it is clear that all three architects differed considerably in the use of visual elements even within the same category of housing. Individual expression was found in the innovative use of materials, brick and concrete, for both surface treatment and for the distinct climate control devices. Pierre Jeanneret preferred using exposed brickwork with concrete bands rendered in white. Many of his house facades are characterized by interesting patterns in projecting bricks or perforated brick screens (*jaalis)*. In some cases the bricks were composed graphically to depict specific images such as the plan of the city or the capital complex (Fig.7.12). Two features that persisted in the works of Jeanneret are: a vertical band of louvres (Fig.7.13) and small windows of different sizes, arranged randomly in the wall (Fig.7.14). Such an arrangement of windows was not very practical considering that to provide shade, several curtains of different sizes were needed or the whole wall had to be curtained. The houses by Jeanneret in Sector 22 were mostly single-storeyed and on a more intimate scale than the other houses. They were generally straight-edged with most surfaces in a single plane. In general, the subtle influence of his cousin, Le Corbusier, can be sensed in the designs of Pierre Jeanneret.

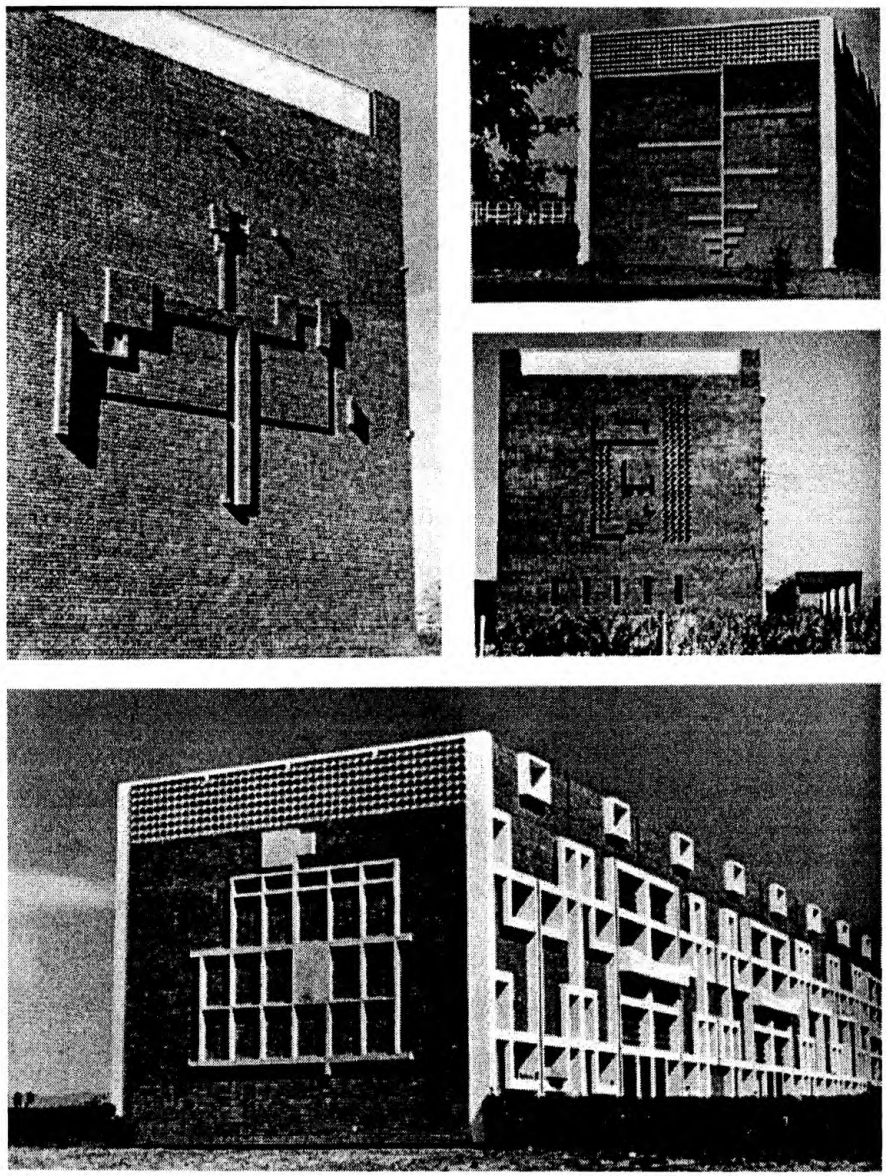


Fig. 7.12 Patterns in brick on the facade of houses by Pierre Jeanneret.

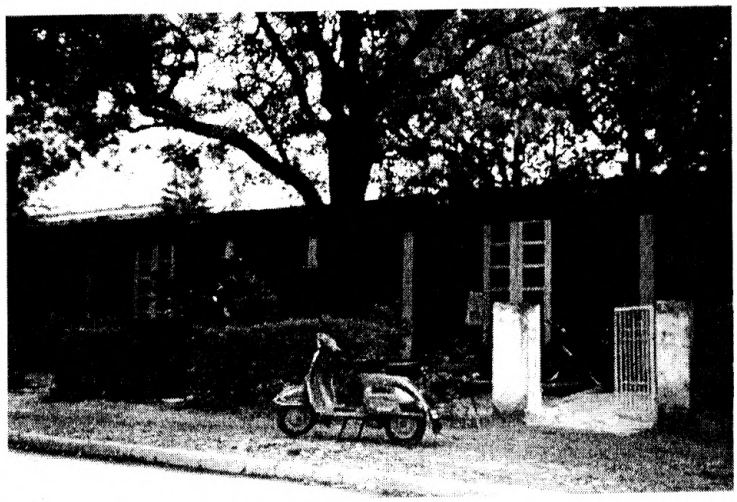


Fig. 7.13 A vertical band of louvres was another typical element in Jeanneret's designs for government housing.

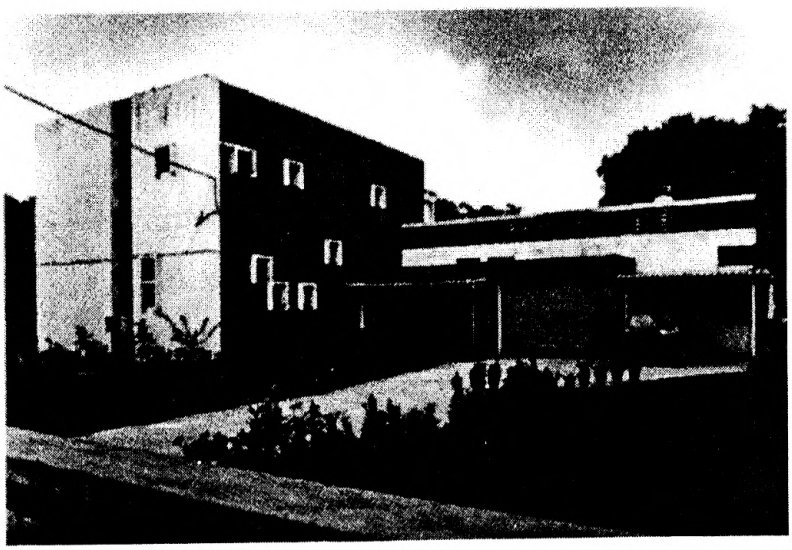


Fig. 7.14 Irregular grouping of small windows on the façade by Jeanneret.

The British architect, Maxwell Fry's house designs were markedly different from that of his French counterparts. It was marked by a more prominent use of perforated screens in both brick and precast concrete (Fig. 7.15). Several design alternates were developed for the screens and balustrades in different housing types. The most common sun-shading device used by Fry was the egg-crate sunbreaker grill (Fig. 7.16). The built volume, in Fry's houses, was marked by a play of cuboids projecting out or recessed in.

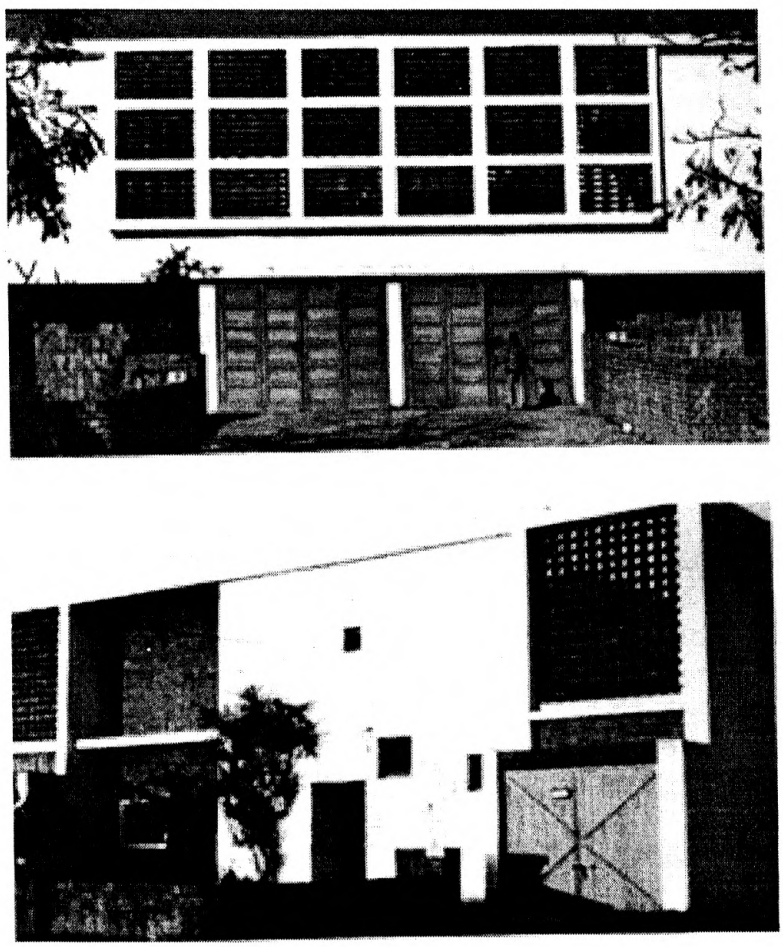


Fig. 7.15 Prominent use of perforated screens by Maxwell Fry.

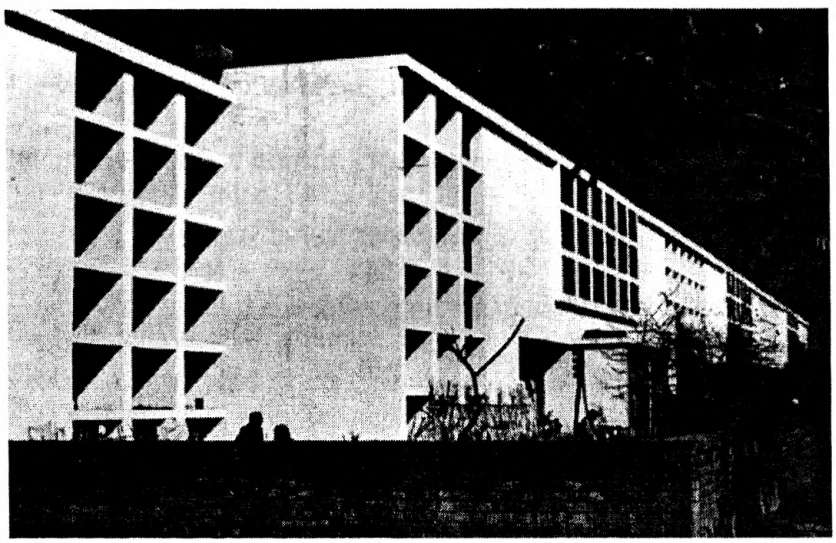


Fig. 7.16 The "egg-crate" sunbreaker grill by Maxwell Fry.

In contrast to both Fry and Jeanneret, Jane Drew's houses were finished in plastered surfaces that were painted white. The facades lack the extensive projections or perforations typical in Jeanneret and Fry's house designs. There was more attention to community design and to designing for economically weaker sections of the population.

In general, the housing in the sector is mostly in exposed brick or plastered and white-washed surface. The use of steel and reinforced concrete was minimized to save on material and labor cost. Variety was provided by the innovative use of bricks, by providing interesting surface patterns and by use of various climate control devices forming an interesting play of light and shade on the surface of the building. Visually, the higher income level houses received more fenestration and attention to detail than the lower category houses that are almost spartan in appearance.

The minimum dwelling in the sector has two rooms with a verandah kitchen, a toilet, courtyard in the front and back and a separate washing facility. Thus, even the smallest of houses in the sector is an improvement over the cramped living spaces in

houses in other parts of the country. This is certainly a commendable achievement considering the budget constraints imposed on the design team.

Though in the first few houses, greater attention was paid to incorporating local customs and patterns, they were not as successful as the later designs that were more modern in design. With time, the architectural team achieved a better understanding of the changing social and cultural needs of the people. Referring to this Jane Drew remarked:

> *The clerk's houses in Sector 22 were built in two patterns. Originally, they were built to a plan which strictly followed the established customs and taboos, and later to a more modern form which had less passage way and where sweepers would cross the living room where balconies had no purdah verandahs. It became clear very early that tradition was not important except where it followed the climate and habits of living. Thus, modern kitchens with cooking on the counter replaced the traditional way of cooking on floor.*

In spite of the foresight and effort of the design team, the housing has undergone several changes and additions. The most prominent user intervention is the addition of an extra room in the rear courtyard or enclosing of a balcony or barsati. The ground floor coverage of most of the house types discussed ranges between 30-40 per cent, which leaves more than half the plot area empty. This is considered a substantial wastage by a population who is used to living in cramped spaces, considering that the city has a substantial homeless population. Absence of covered parking space is another major drawback of these houses. Considering the harsh summer sun, covered parking spaces are a necessity. Parking under the trees on the street is a common alternative but most residents prefer to cover a part of the front courtyard with light-weight roofing sheets to form parking space. The various additions signify that the designers fell short of

anticipating the space requirement of the people. Most government houses lack maintenance and deficiencies in workmanship are now more evident than ever. In general, the houses have survived without major changes in form and structure.

2. COMMERCIAL DEVELOPMENT

There are two kinds of commercial development in the sector. First is in the form of one to three-storeyed shop-cum-office (SCO) blocks along the V2 and V3 avenues (Fig. 7.17). This has specialized shops and showrooms catering to the whole city. The second type of commercial development is along the V4 shopping street, forming the local shopping center. The main part of the shopping street is three-storeyed designed according to the architectural controls. It consists of both shop-cum-office (SCO) and shop-cum-flat (SCF) development. Each SCF units (Plate 7.12) has shop space on the ground floor and residential accommodation on the upper two floors. The shop is of a standard 14'-6" width, with a small store in the back and an internal flight of stairs leading to the residential unit. The residential unit is in the form of a single bedroom, duplex apartment with a roof terrace for sleeping. The residential façade was protected from the sun by the use of precast concrete *jaalis* and deep window projections. The storage space on the ground floor does not suffice for most businesses, leading to the use of residential space for the same.

The V4 shopping street in Sector 22 has a second type of commercial development (Plate 7.13) in the form a small piazza with a cinema hall (Kiran Cinema, Fig.7.18) designed by Pierre Jeanneret and a row of bigger shops with a parking lot in the front.

Fig. 7.17 The Shop-cum-office development along the V3 road in Sector 22.

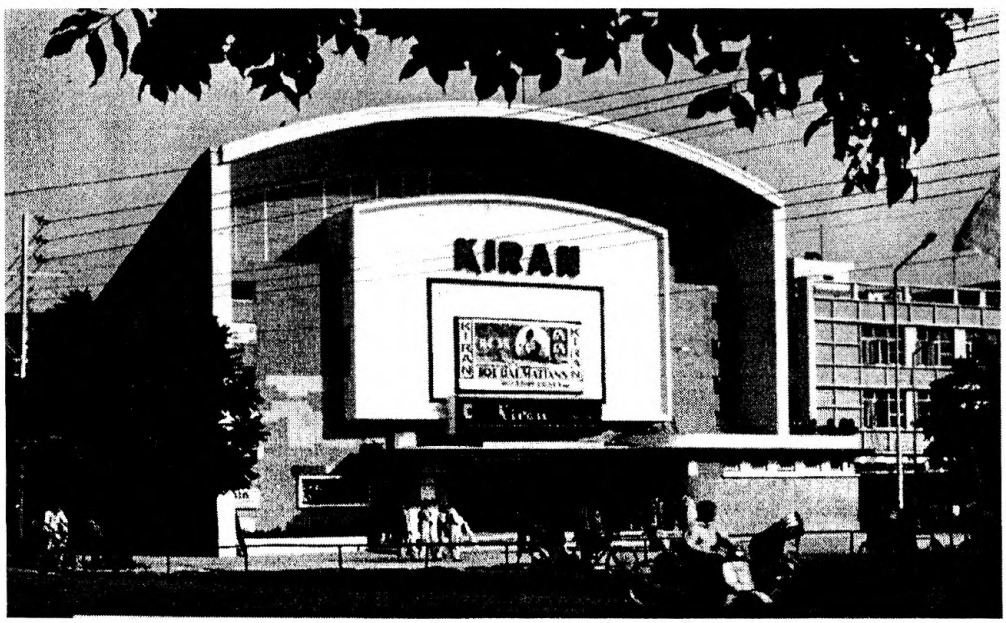
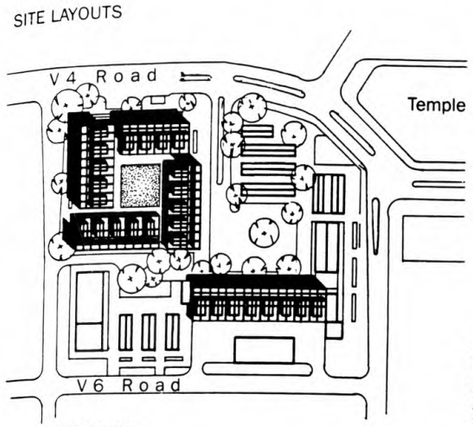
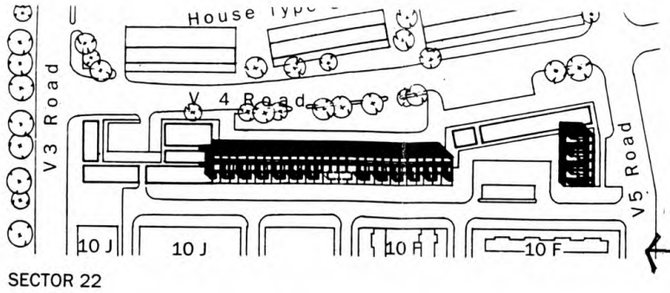
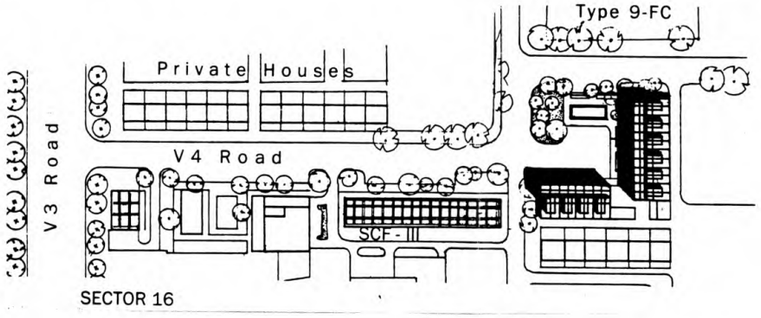
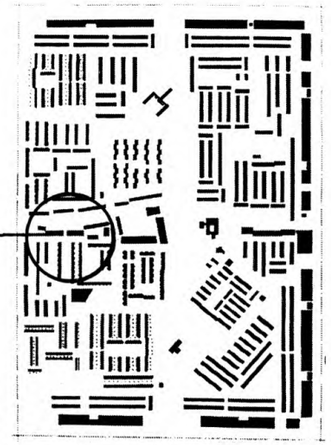


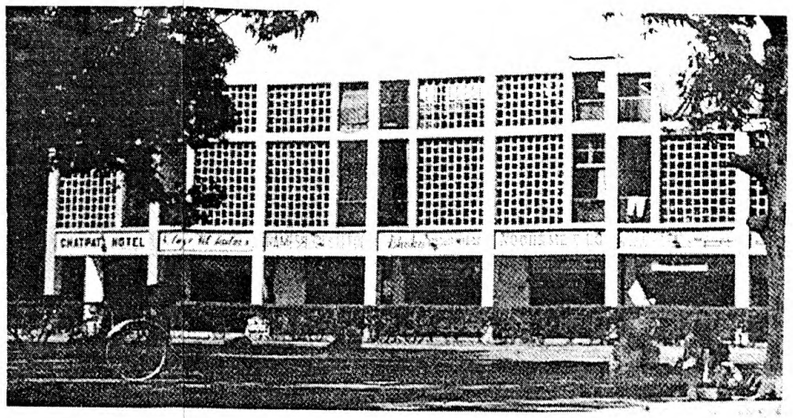
Fig. 7.18 The Kiran cinema hall designed by Pierre Jeanneret on the V4 shopping street.

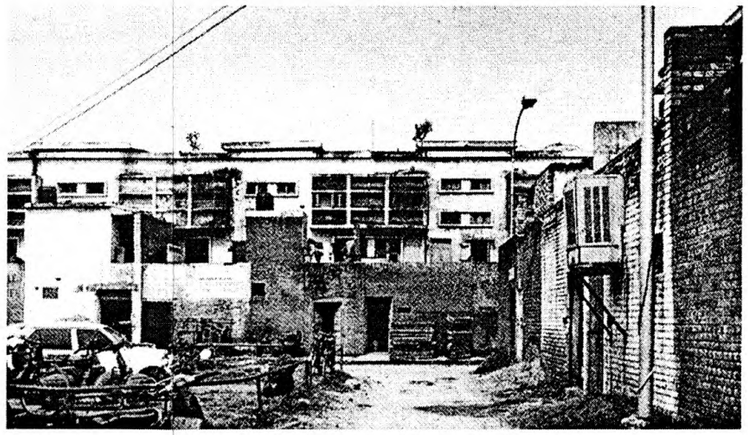












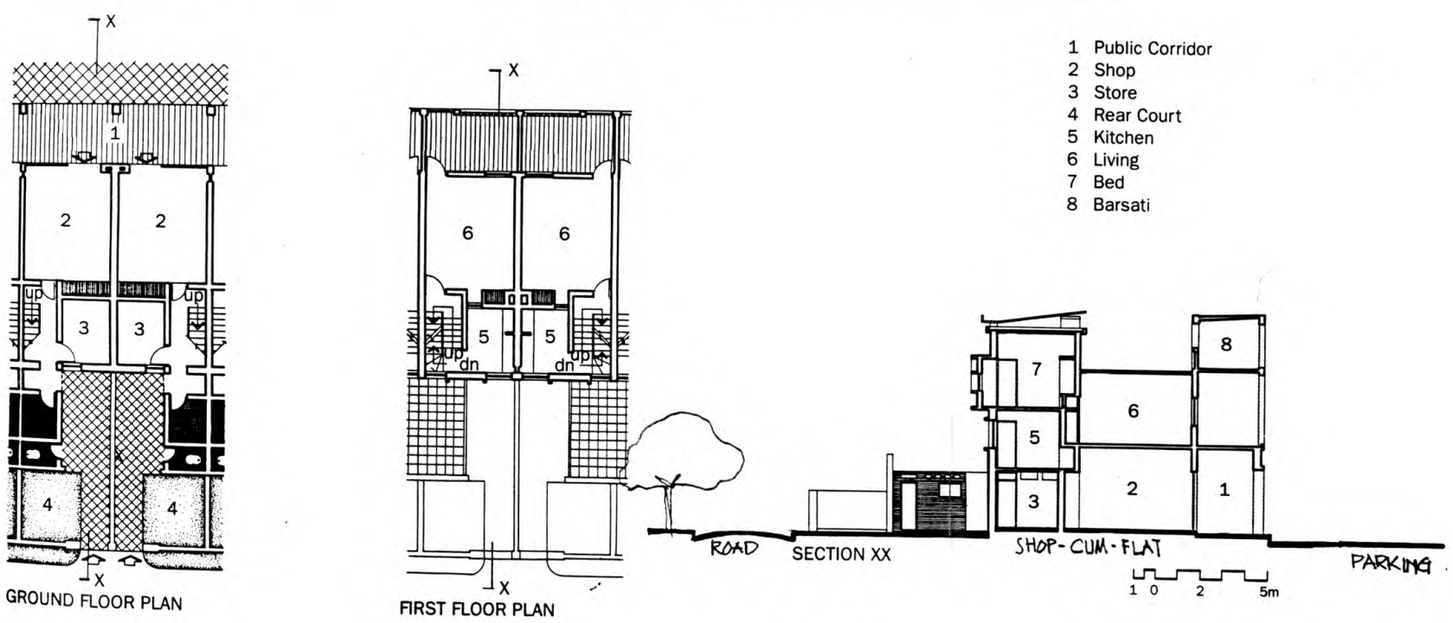
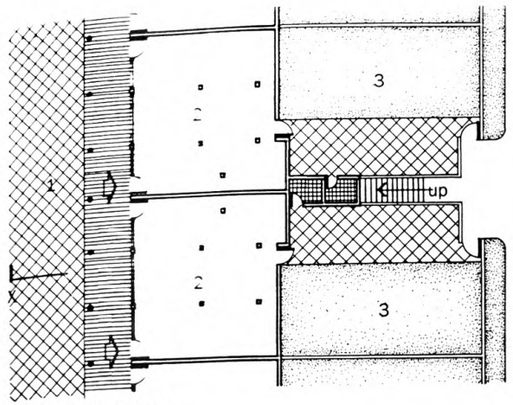
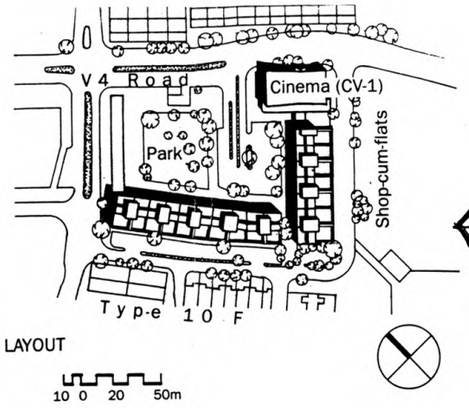


Plate 7.12 Shop-cum-flat (SCF) units by Jane Drew.

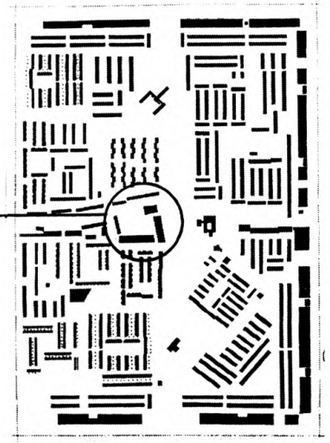


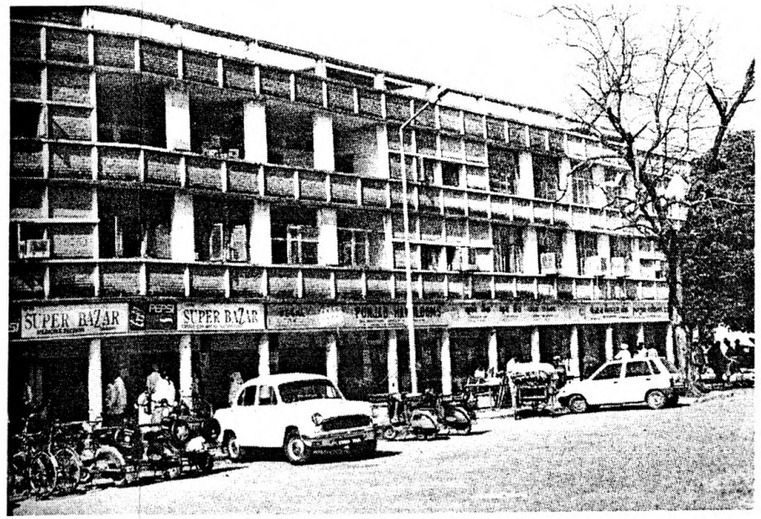
GROUND FLOOR PLAN

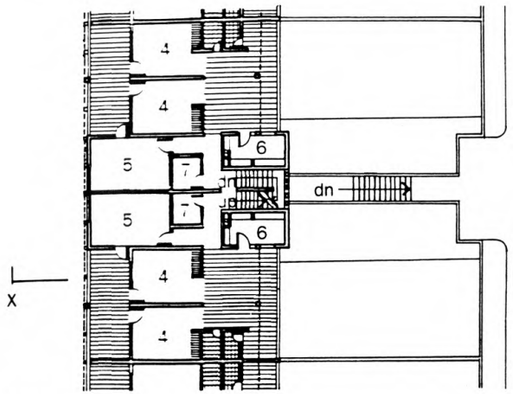


SITE LAYOUT

10 0 20 50m



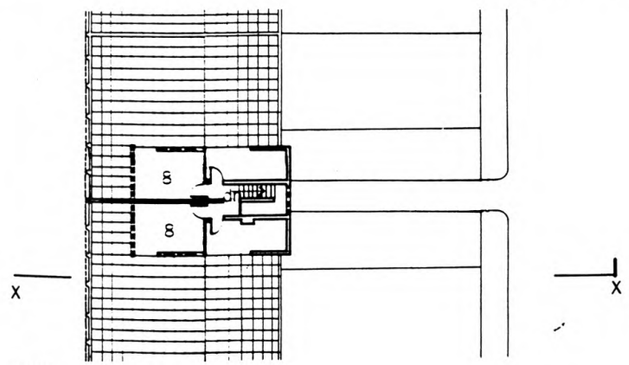




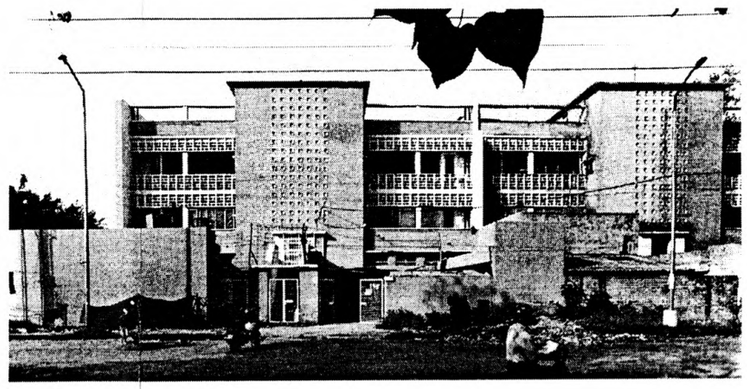
SECOND FLOOR PLAN

1 Public Corridor
2 Shop
3 Court
4 Bed
5 Living
6 Kitchen
7 Store
8 Barsati

2 0 4 5m



THIRD FLOOR PLAN



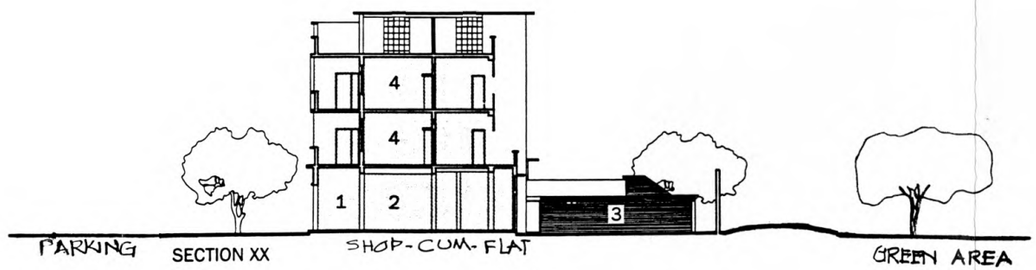


Plate 7.13 Shop-cum-flat (SCF) units by Maxwell Fry.

The ground floor has a triple bay showroom that can be subdivided into smaller shops as the owner may deem necessary. The upper floors have a two-bedroom unit on each floor. Sun protection is provided by deep verandahs, *jaalis* and small window openings. In a lot of instances, the rear courtyard and balconies have been enclosed to yield more commercial space. Also due to the absence of sufficient display space, there is a noticeable stacking and displaying of goods outside the shop, which is typical in Indian markets.

Both types of shop-cum-flat units in Sector 22 are facing similar problems associated with increase in commercial activity along the V4 shopping street. The escalating cost of commercial land makes it more profitable to use the upper floors for commercial purposes. While such a change in land use is prohibited according to the Capital Development Act, in recent years the authorities have permitted it. It is evident that unlike the traditional multi-functoinal haveli, the concept of mixing residential and commercial areas did not work in Chandigarh. The main reason for such a failure was the design of the SCF's for apartment living, which does not work well in the Indian cultural scene. The apartments were not only noisy because of street traffic and commercial activity, but were also a security risk because of unfamiliar people traversing the premises. The residents also complain of lack of neighborly feelings and the low quality of life offered by a single bedroom, relatively cramped residence.[166] The low success rate of the SCF units prompted the Chandigarh Administration to rethink the Phase II master plan, where SCF's were scrapped in favor of SCO development, which makes better utilization of commercial space.

[166] Interpretations from a discussion with Architect, R.K.Sabharwal, Senior Architect and Town Planner, Chandigarh Administration.

Of all the sectors in Phase I, Sector 22 was the worst hit by the changing scenario of the city as it started to grow. It was one of the first sectors to have civic facilities, making it a high demand residential sector. As a result, the population of this sector was high from the very beginning. Furthermore, the central location of the sector, which is in close proximity both to the Inter-State Bus Terminal and the City Center, has made it a high demand commercial area too. Coupled with the growth of Chandigarh as a major commercial center of the region, and the burgeoning population of the city, the sector is pressed for commercial space, leading to changes in the shop-cum-flat setup.

3. OPEN SPACES

From the figure/ground plan of the sector, it is clear that a major part of the sector is devoted to open areas. There are a variety of open areas constituting the fabric of the sector, ranging from community to private open spaces. They are:

- **The central green zone**

The central green zone runs through the length of the sector forming the park area of the sector. It not only contains parks and playgrounds for leisure activities but also houses the educational and health care facilities of the sector. Parts of this green zone have been occupied by temporary markets called 'Rehri Markets'. A Rehri Market (Fig. 7.19) is made up of temporary wooden stalls and wheeled carts, which have arisen because of the high cost of commercial land. In most cases such markets are illegal but they have managed to survive because of political reasons. Due to low infrastructure cost, goods are sold at cheaper prices in the Rehri Market, making it popular with the

residents, who do not seem to mind its presence. Another reason for the growth of such informal commercial development is the lack of provision for the informal sector in the Chandigarh Master Plan. Low budget, informal markets are a common occurrence in most Indian cities and were overlooked in the design of Chandigarh. According to S.K. Midha, the Chief Architect of Chandigarh, the growth of such informal sector markets is one of the most pressing problems facing the city today.[167] To counteract such a haphazard growth of commercial activity, several low cost shopping complexes have been constructed such as the Sabzi Mandi, which is the fruit and vegetable market in the sector (Fig.7.20). Another type of low cost market provision is in the form of '*haats*' or markets spaces that are rented on temporary basis.

Fig. 7.19 Rehri Market in Sector 22, forms a part of the informal commercial activity in the city.

[167] From an interview of S.K. Midha, by the author, on 14 July, 1998, Chandigarh.

Fig. 7.20 A low cost informal sector shops constructed by the administration to counteract haphazard development such as the Rehri Market.

- **Park areas around which houses are grouped**

While most of the housing in the sector is row housing, part of it is grouped around open spaces, most of which are planted with tress. These open spaces were designed as social spaces for community activities. In some parts of the sector, they lie in a state of neglect (Fig. 7.21), while in others they are used extensively by the residents as meeting places or for hosting festivals or weddings. Some of these open spaces are provided with playing areas for the children or with a religious shrine to promote group activities. If proper care is taken, these spaces can help revitalize the social life of the housing blocks.

Fig. 7.21 A lot of park spaces in the sector lie in a state of neglect.

- **The incidental open spaces**

Incidental open spaces (Fig. 7.22) within the sector are the residual spaces left on the corners of housing blocks or between adjacent housing blocks. Being awkwardly placed, they are not of much use socially.

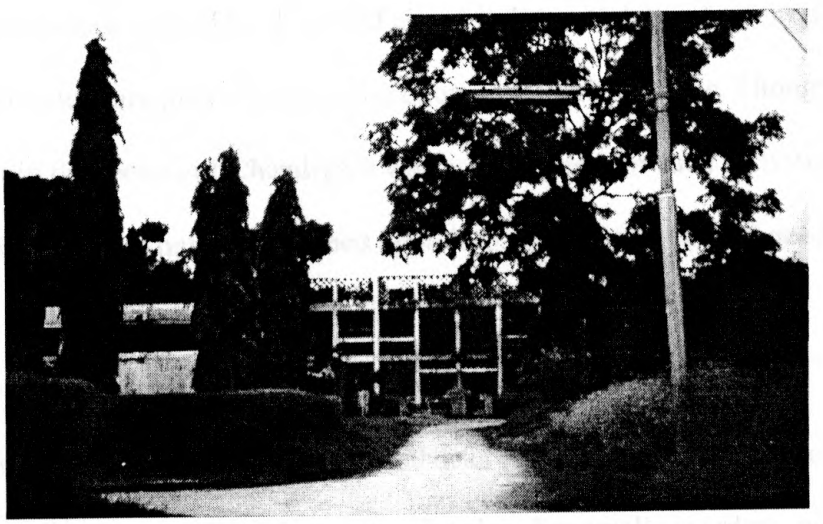


Fig. 7.22 While several incidental open spaces are well maintained, some of them are an eyesore with dense overgrowth.

Several of these are planted with trees, providing shade and greenery within the sector. Some of them have become dumping grounds for garbage because of absence of adequate garbage disposal services within the sector. In a lot of instances, small religious shrines have been constructed illegally in these open spaces. Overall, their main role is to contribute towards a feeling of openness within the sector.

- **Market piazza**

The V4 shopping street opens on a vast paved piazza, which was designed as parking space for vehicles. In the absence of any other kind of market gathering space, the parking piazza is used for informal activities, some of which are generated by the presence of hawkers and street vendors. Peddling of goods from the pavement or from *rehris* (wheeled wooden carts) is very common in India, mainly because commercial land in urban areas is too expensive for the economically weaker sections of the society. In Chandigarh, there was no provision for informal trading in the shopping centers, leading to the use of parking lots and pavements for the purpose. People in India, like to gather in community open spaces (*chowks* in most old cities) to interact, talk, play, eat and relax. Generally, such spaces are provided in conjunction with market spaces. Though the shopping street in the sectors of Chandigarh was not designed for such activities, nevertheless, the residents have encroached upon it to suit their habits and needs.

- **Mandatory open spaces in residential plots**

All the residential plots have mandatory setbacks within which no construction is permitted. The setbacks vary according to the plot size. For small size plots, only front

and rear setbacks are necessary, whereas for medium size plots, a narrow setback on one side is required. In case of large size plots, setbacks on all sides are required, resulting in rows of detached houses. The purpose of these setbacks is to ensure a uniform building line and to prevent congestion on the plot. The setbacks yield courtyards on the front and the back, which can be used as family spaces. Though the percentage of open areas in these houses may amount to more than that in most traditional Indian houses, they still cannot match the utility and effectiveness of the internal courtyards in *havelis*. While these form extremely private spaces, the courtyards in the houses in Chandigarh are essentially open to public view, making them semi-private spaces.

4. EDUCATIONAL, HEALTH, RELIGIOUS AND OTHER ESSENTIAL SERVICES

The concept of the neighborhood as a self-contained community is based on the provision of all essential services within walking distance of residential units. In the sectors in Chandigarh all daily need facilities were provided within the confines of the V2 and V3 boundary roads, allowing the residents to spend the "24 hour solar day" more productively, as was Le Corbusier's goal in the design of Chandigarh. The facilities provided in Sector 22 include: a nursery school, a primary school, two senior secondary schools and two high schools; a health center and a veterinary hospital; several hotels, restaurants and a low cost lodging facility (Sood Dharamsala), gas stations and several religious facilities (temples and gurudwaras).

CONCLUSION

Sector 22 designed by Drew, Fry and Jeanneret, presents a multitude of experiences in the design of housing by the architectural team. There has been some criticism to this apparent variety, which some claim to border on the verge of confusion. According to Jane Drew:

> *One of the failings of Sector 22 is that the housing was designed by three architects and there is some diversity of experience, each architect having a different sense of space and order. I think it is good to have a change of experience within a city, but it would have been better to have had a change of experience from Sector to Sector and not within one Sector.*[168]

While according to Norma Evenson, "The fault, however, would appear not to lie in the diversity of styles of the three architects but in the failure to create coherent relationships among groups of buildings."[169] The main point being that even though the design of individual elements was laboriously worked upon, the sector as a whole falls apart. Such a lack of coherence reflects not only within a sector but also in the city as a whole. To some extent, this is a result of the application of the "four functions of urbanism" from the "Charter of Athens", which all the members of the design team were familiar with. Such an approach to the design of the city is expressed by Le Corbusier in the "Statute of the Land":

> *The force of this Charter [Athens Charter] lies in giving the first place to the dwellings: the environment of living—the family under the rule of '24 solar hours'. The second place is given to working, which is the daily act of human obligation. The third is the culture of body on one hand and an intellectual leisure on the other. When all these goals have received their definitive containers, it is possible to give each of them a*

[168] Drew, Jane. (1961). *Living*. In *Marg*, Dec.1961, p.25.
[169] Evenson, *Chandigarh*, p. 47

respective rightful place and at this moment can interfere the problem of realizing the contacts: that is 'circulation'.[170]

Thus, the approach to planning of the city was based on the modernist paradigm of treating the various elements separately, with their 'contacts' receiving least attention. Such a rationalist approach was later rejected by some of the members of C.I.A.M. , who found it to be an inappropriate solution to urban design problems, and searched for, "the structural principles of urban growth and the next significant unit above the family call."[171] There was an increased awareness of the need for the city to possess a sense of 'identity' or 'belonging' and to also respond to the social and psychological needs of the inhabitants. Such a sensibility was to avoid relying on a nostalgic representation of the traditional city. Thus, the very idea Chandigarh was designed on was discarded a few years after the design of the city. This is another reason why the functional zoning and single land use restrictions in Chandigarh need to be reconsidered in the present context.

While there are several shortcomings in the sector, there are several commendable features as well that must be highlighted. Foremost amongst them is the provision of all basic facilities such as a covered kitchen, a separate bath and W.C., and proper water supply and drainage facilities, even for the lowest category of housing in the sector. Second is the provision of ample open spaces to permit adequate light and air circulation within the houses. Another important feature is the scientific approach to climate control, where even the orientation of buildings was carefully worked out to minimize the use of mechanical means of climate control. The landscaping within the sector also received

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[170] Le Corbusier. *Statute of the Land.* In *Chandigarh: Planning and Architecture.* [World Wide Web Page]. Available:http://www.nic.in/chandigarh/mplan3.htm. April 6, 1998.

[171] Frampton, *Modern Architecture: A critical history*, p.271.

careful attention, resulting in a garden-like setting. Physically, the living conditions within a sector in Chandigarh are superior to that in other cities in India.

As a part of the organic growth of the city, the sector has undergone several changes and additions as the residents tried to adapt the living spaces to suit their lifestyle. These alterations, though not drastic, act as pointers for future development in the city. A study of the second and third phase sectors will reveal if observations from the first phase sectors, were used to improve future development or were ignored.

STUDY OF A PHASE II SECTOR

SECTOR 44

Sector 44 was constructed in Phase II of Chandigarh and like the rest of the Phase II sectors, is a high-density sector. Covering an area of 267.50 acres, it was designed to house a population of 23,000 (as compared to 21,900 for Sector 22, Refer to Table 7.2). According to the census report of 1991, the population density of the sector is 42.79 persons per acre. Though it appears to be considerably less than that of 76.66 persons per acre in Sector 22, it is nevertheless remarkable that the population reached such a level in just a few years.[172] The same can be said for the housing density, which was already 9.62 houses per acre in 1991, as compared to 15.41 houses per acres in Sector 22, which has one of the highest densities in the first phase sectors. Thus, compared to Phase I, the Phase II sectors were built and occupied much more rapidly. This was mainly due to the rapid growth of the population of Chandigarh, which reached a decennial growth rate of 75.55 per cent, for the period 1971-81, thus necessitating higher density. When the construction of the second phase sectors began, there were already substantial numbers of informal settlements on the outskirts of the city. Several small villages existed in the area demarcated for the second phase of construction. Due to political pressure and lack of incentives for the village populations, these informal settlements remained. As a result, several sectors in Phase II have villages and squatter settlements incorporated within their boundaries. Prominent amongst them are Sector 41, which is substantially occupied by Villages Badheri and Buterla, and Sector 45, half of which is occupied by Village Burail.

[172] Construction of the Phase II sectors was started only in the late 1980's. So at the time of the last population census, in 1991, the sector was only partially occupied. Thus the statistics from the census do not reflect current (or intended) statistics.

TABLE 7.2

Chandigarh City: Stipulated and Actual Population by Sectors

Sector	Stipulated Population	Actual Population in 1991	Actual Minus Stipulated Population
1	*	53	*
2	600	591	-9
3	600	719	119
4	600	557	-43
5	600	701	101
6	*	41	*
7	11,000	11,594	594
8	8,200	6,739	-1,461
9	2,400	2,613	213
10	4,600	3,809	-791
11	4,800	5,187	387
12	4,200	5,857	1,657
14	11,700	7,055	-4,645
15	16,900	16,513	-387
16	5,800	5,358	-442
17	1,000	1,420	420
18	9,800	7,843	-1,957
19	13,200	11,647	-1,553
20	23,200	26,079	2,879
21	14,500	13,669	-831
22	21,900	22,230	330
23	15,700	16,827	1,127
24	9,500	9,544	44
25	9,000	9,447	447
26	2,000	1,899	-101
27	11,500	14,611	3,111
28	17,100	10,945	-6,155
29	17,800	13,658	-4,142
30	10,900	11,698	798
31	11,500	9,395	-2,105
32	10,000	9,822	-178
33	11,600	6,435	-5,165
34	8,500	5,896	-2,604
35	25,800	13,338	-12,462
36	6,400	3,705	-2,695
37	25,000	16,688	-8,312
38	25,000	13,032	-11,968
39	10,000	1,903	-8,097
40	20,000	17,334	-2,666
41	12,000	13,070	1,070
42	7,000	1,733	-5,267
43	5,000	3,544	-1,456
44	23,000	11,447	-11,553
45	15,000	10,883	-4,117
46	15,500	8,411	-7,089
47	20,000	14,754	-5,246

* Stipulated Population not indicated.

These villages (Fig. 7.23 & 24) are mini townships, complete with residential, commercial and recreational facilities, none of which conform to the standards of Chandigarh city. These peripheral settlements, which are now a part of the city, are a constant reminder of the inability of the city to cope up with the growing population. Sector 44 does not have any such village settlement within its boundaries, thus ensuring an uninterrupted layout.

Fig. 7.23 A village settlement inside the sector area in Chandigarh.

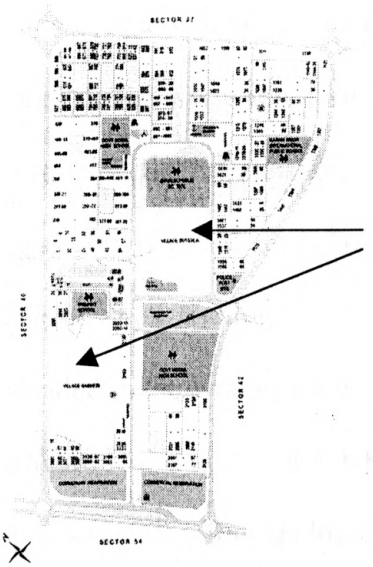


Fig. 7.24 Plan of Sector 41, with villages Badheri and Buterla occupying almost half the sector

MORPHOSTRUCTURE

Physically the geometric structure of Sector 44 (Fig. 7.25) is based on the same principles as Sector 22. The hierarchy of the road system follows the normal pattern of progression from the V2 or V3 roads, to the V4 shopping street and V5 loop road, and from there to the V6 roads leading to the houses. The main difference lies in a more rigid application of a grid as compared to the Phase I sectors. In Sector 44, the V5 loop road is almost a perfect rectangle as opposed to the meandering loop road in Sector 22. The strong, orthogonal geometry of the V6 access roads also makes the plan appear more rigid than its counterparts in the first phase. It appears as if no substantial effort was made to design individual parts of the sector. Instead, a rigid grid was applied in most of the Phase II sectors.

A study of the figure/ground plan (Plate 7.14) of the sector reveals a very even texture of the built up areas. Most of the built volume is arranged either horizontally or vertically. There were no plots arranged diagonally as in Sector 22. From the footprint of the buildings, it is clear that all private housing is in the form of row housing. The adjacent houses share party walls, forming continuous linear blocks. Such an arrangement reflects the restraints imposed by the frame controls where the building line on all sides was clearly established. To maximize the usage of land, all the area within the building line is covered, leading to long rows of uninterrupted plain facades. Some variety is provided in the arrangement of the government housing and the housing built by the Chandigarh Housing Board (CHB). Some of the housing types have units grouped around an open space, forming enclosed blocks. This feature not only provides some variation in texture to the built

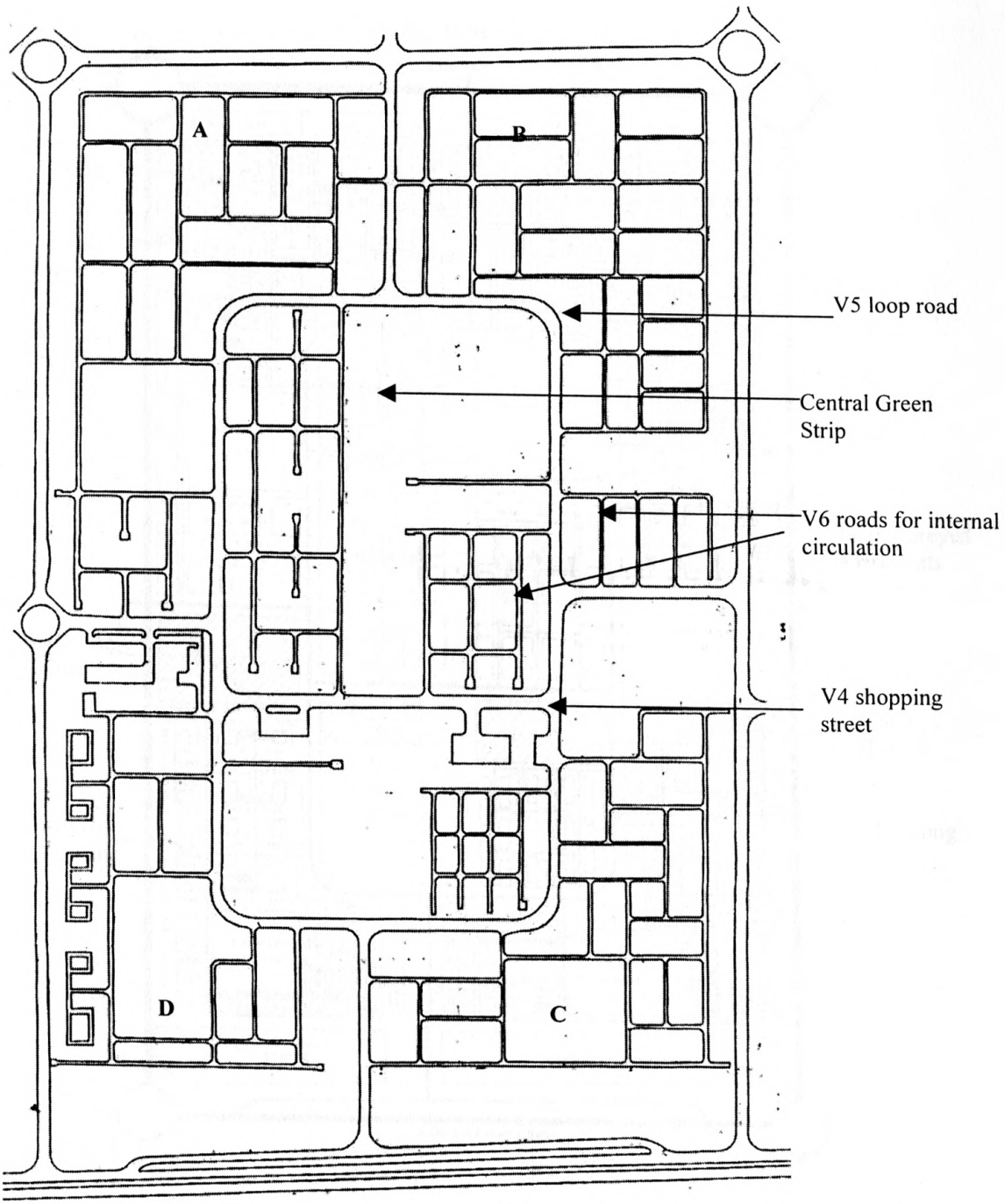


Fig. 7.25 Road layout of Sector 44 is based on a strong orthogonal grid.

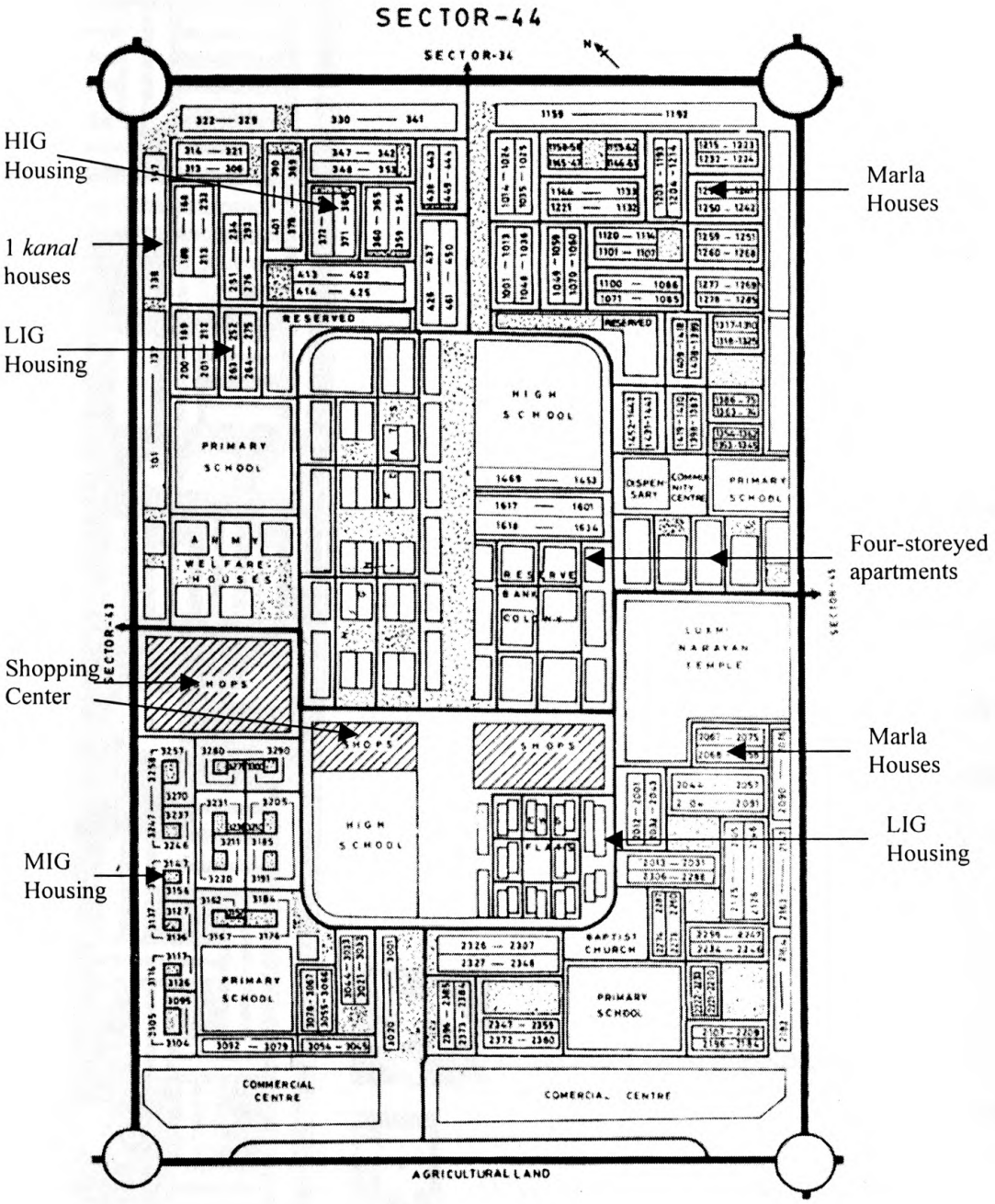
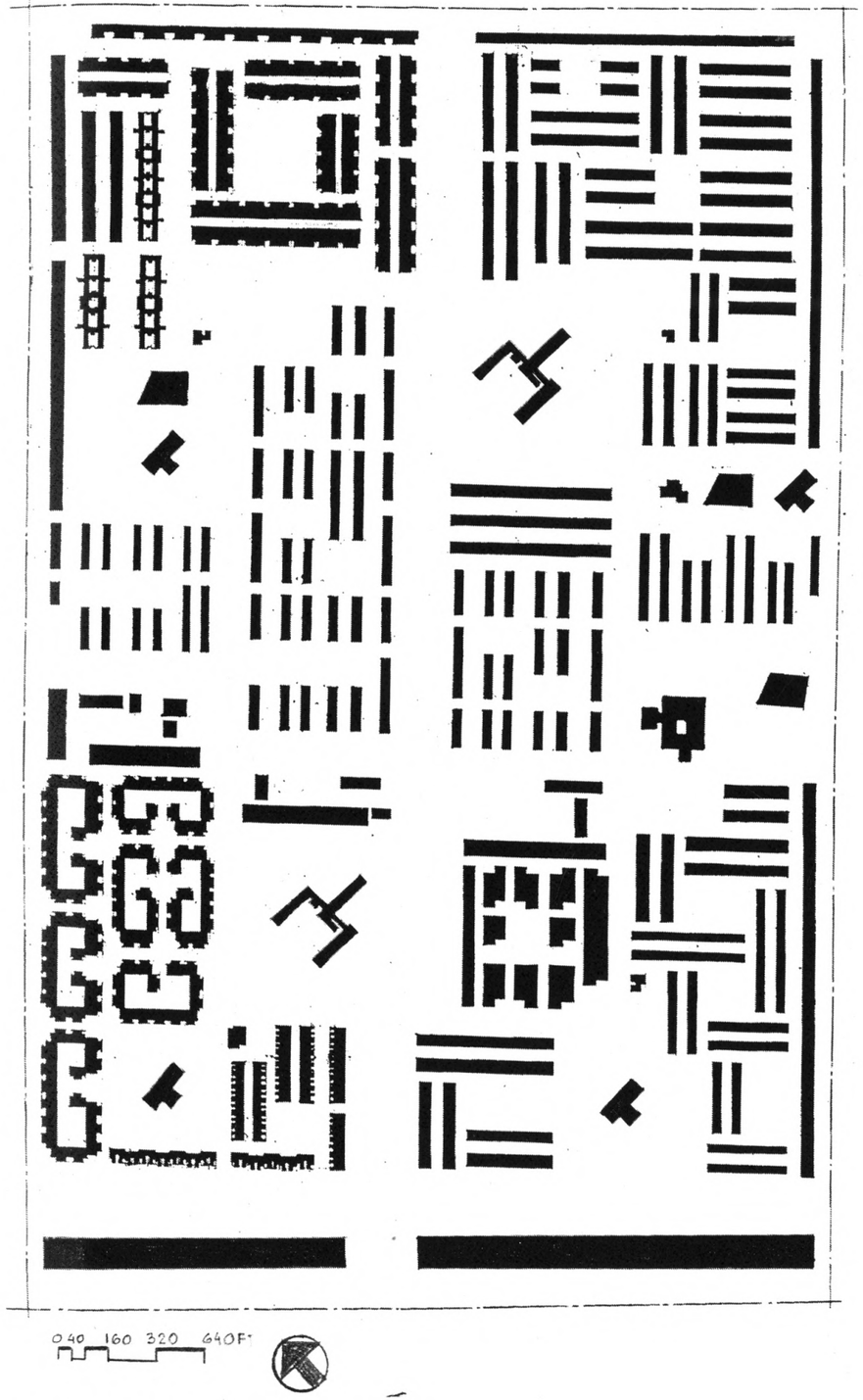
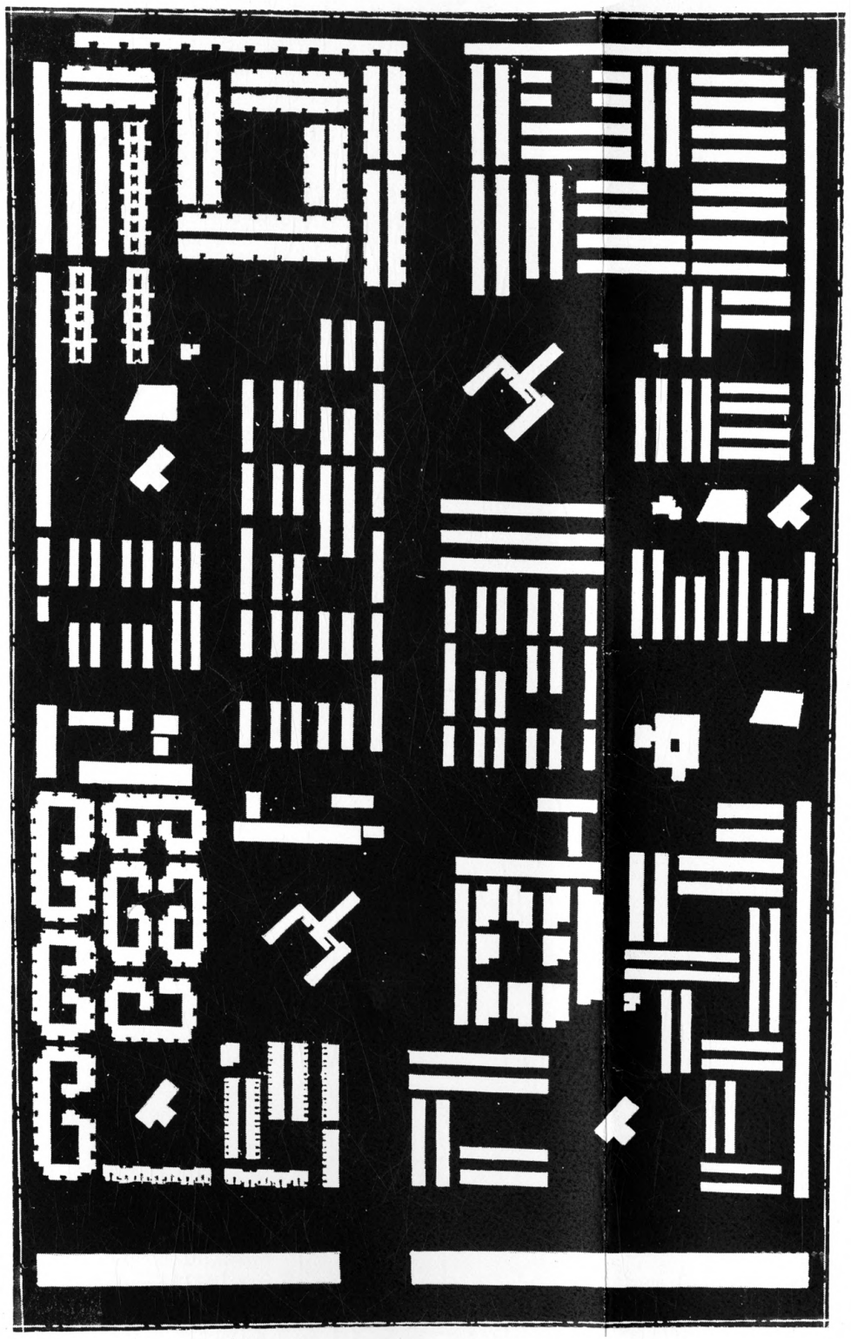


Fig. 7.26 Layout of Housing and Shopping Areas in Sector 44.





Represents Proposed High School

Represents Proposed Primary School

Represents Proposed Health Center

Plate 7.14 Figure/ground plans of Sector 44.

fabric of the sector but also forms comfortable spatial enclosures, which can be used for communal activities. Some of these are used as parks and playgrounds. Most of the group housing is in the form of multi-storeyed blocks with little private open space for individual units, thus, promoting the use of community open spaces.

In general, the amount of open space in the Phase II sectors has decreased from that in Phase I sectors. This reduction is evident in Sector 44, where the central green zone is considerably narrower than that in Sector 22. The landscaping in Sector 44 appears to have received considerably less attention than Sector 22, which shows a carefully worked out arrangement of trees of different species depending on their foliage and flowering habits.

A detailed study of the various elements that form the structure of the sector will yield more clues to the changes that the Phase II sectors have undergone as compared to the Phase I sectors. Thus, a study of the housing, commercial development, open areas and institutional buildings in the sector follows.

1. HOUSING

Sector 44 houses middle to low-income residents on medium size plots. The sector population consists mostly of working class people. A large part of the sector was sold to the Advocate's Housing Society who allotted the plots to eligible applicants, selected on a lottery basis. Thus, the sector has a predominant lawyer (or advocates as they are called in India) population. Such a social grouping of the sector on the basis of trade became more popular in the second phase of Chandigarh. This particular

characteristic resembles the social organization of a traditional *mohalla*, which is based on occupation, caste or ethnicity.

Due to the eventual housing shortage in Phase I, plots of only 1 *kanal* or less were stipulated in Phase II, with only a small quantity of 1 *kanal* plots in most sectors. Sector 44 has only twenty-one plots with an area of 1 *kanal*, all of which are sited along the periphery of sub-sector block 'A'. In general, Sector 44 has a mix of both private housing and subsidized housing designed by the Chandigarh Housing Board (CHB) and other housing societies. One major change that took place in the second phase of Chandigarh, was the constitution of the Chandigarh Housing Board (CHB), which is provided with land at subsidized prices by the Chandigarh Administration. The Housing Board constructs standardized houses for different income groups on these plots, and then sells them to interested individuals or institutions. The main problem with such housing is the low quality of construction. Because of the standardized design, such housing is dull and repetitive, forming a contrast to the government housing in Sector 22. There is not much attention paid to design innovation or even to the need to provide comfortable living spaces. The main concern is economy of construction and an increase in the density of housing to cater to growing demands. As a result, most of the housing developed by CHB is in the form of multi-storeyed flats. Despite the negative affect of such development on the image and culture of the city, it is a popular alternative. According to a survey, by December 1998, the CHB had constructed approximately 40,544 housing units, representing roughly 40 percent of the city's housing stock.[173] The housing constructed by the CHB falls into five categories:

[173] Krishan, Gopal. (1999). *Inner Spaces – Outer Spaces of a Planned City, A thematic Atlas of Chandigarh.* Chandigarh: Chandigarh Perspectives. Map 11.

1. High Income Group (HIG) Housing
2. Middle Income Group (MIG) Housing
3. Lower Income Group (LIG) Housing
4. Economically Weaker Section (EWS)
5. Sites and Services (S&S)

In Sector 44, the Chandigarh Housing Board built more than half the housing. It consisting of three categories of housing defined by the income level of the residents. They are:

- **HIG housing**

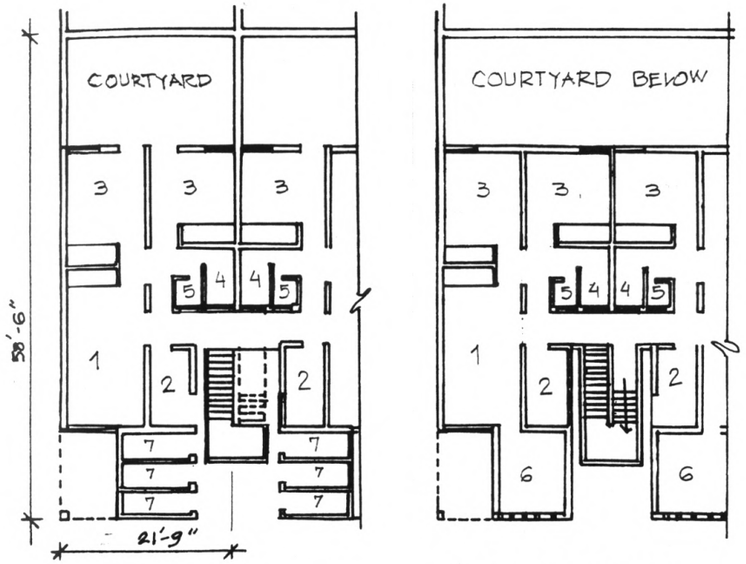
All the HIG units (Plate 7.15) are concentrated in Sector 44-A, which also has all the 1*kanal* houses, making this sub-sector the highest income area of the sector. The HIG units by the CHB are in the form of three-storeyed housing blocks. Each floor houses an independent two-bedroom unit. The plan of each unit is a simple rectangle, within which is provided a living room, a kitchen, two bedrooms, a toilet and a separate bathing space. The adjacent units share a common semi-covered staircase, resulting in a six-unit cluster. The ground floor unit has a small verandah in the front and a courtyard in the back. The upper floor units have small terraces, which are not of much use. With a ground coverage of 66 percent, these houses have relatively less open spaces compared to the houses for the same income group in Phase I sectors. There is an attempt to compensate for the lack of private open spaces by grouping these houses around parks and playgrounds. In these houses the lack of private open spaces has prompted people to use the community open spaces. This helps in ensuring their upkeep and maintenance.

The exterior façade uses a combination of exposed brickwork and concrete, both of which are poorly finished. There is no visible attempt to compose the individual elements in the façade. Whereas, the first phase government housing was marked by a distinct character provided by the use of climate control devices, the second phase has markedly unadorned facades. Even the use of climate control devices such as *jaalis*, louvres and *chajjahs,* is conspicuously missing.

One advantage of such housing is the high degree of social interaction it affords. This is mainly due to the arrangement of houses in small clusters, which allows easy interaction. Another factor is the absence of open space inside the house, which forces people to come outside and use the community open spaces (While this is a negative aspect of housing, it can be seen to have a positive social affect).

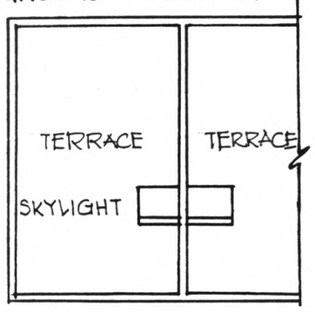
- **MIG housing**

All the MIG housing in Sector 44 is concentrated in sub-sector 'D', which is consists only of this category of housing. The MIG housing (Plate 7.16) is in the form of four-storeyed blocks that are clustered around central green spaces. Each floor has a two-bedroom residential unit, covering an area of 638 sq.ft. The ground coverage is 76 per cent, much higher than that in Sector 22 (which ranges between 30-40 per cent). The ground floor units have a rear courtyard measuring 13'-6" X 14'-9", and a small 3 ft. wide verandah in the front. The rooms have windows opening directly on to the street, which limits their use. Lack of privacy, is thus, a major concern in the ground floor units.

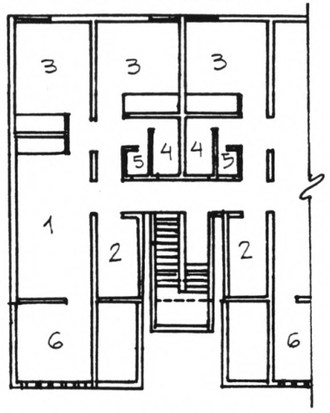


GROUND FLOOR PLAN

FIRST FLOOR PLAN



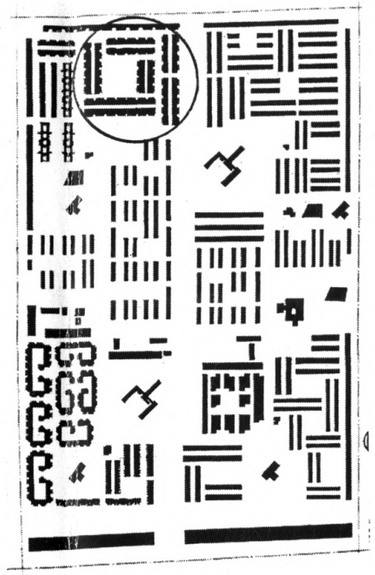
TERRACE FLOOR PLAN

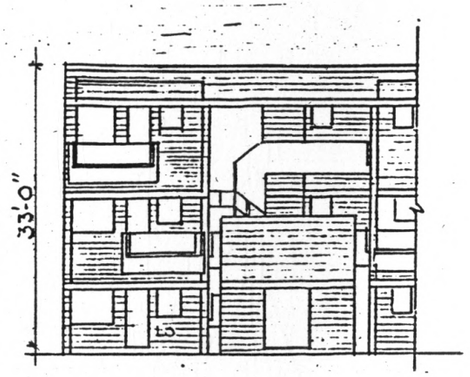


SECOND FLOOR PLAN

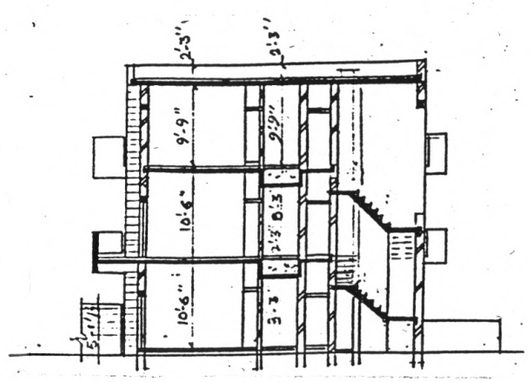
1. LIVING ROOM
2. KITCHEN
3. BEDROOM
4. BATH
5. W.C.
6. TERRACE
7. CYCLE STAND

Plate 7.15 High Income Group (HIG) Housing by the Chandigarh Housing Board.





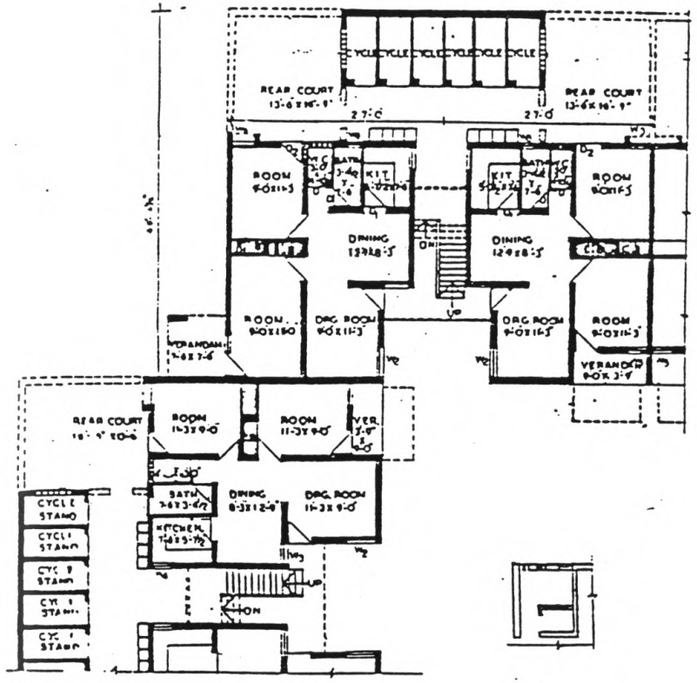
ELEVATION



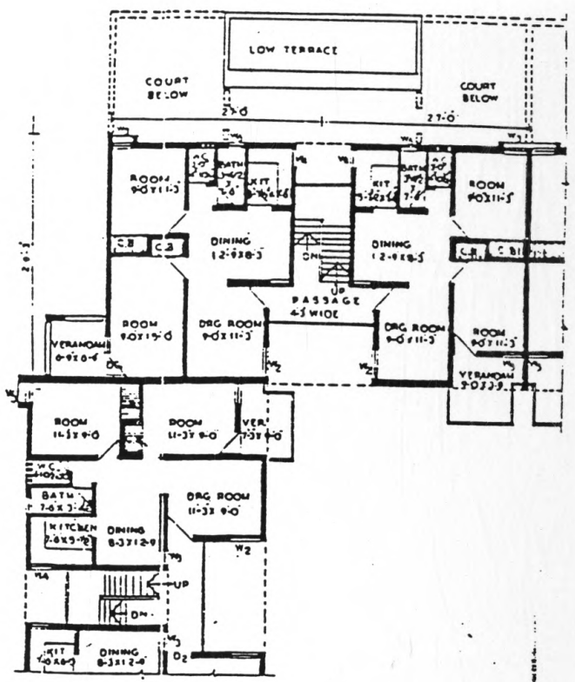
SECTION

HIG Housing
Sector 44-A, Chandigarh

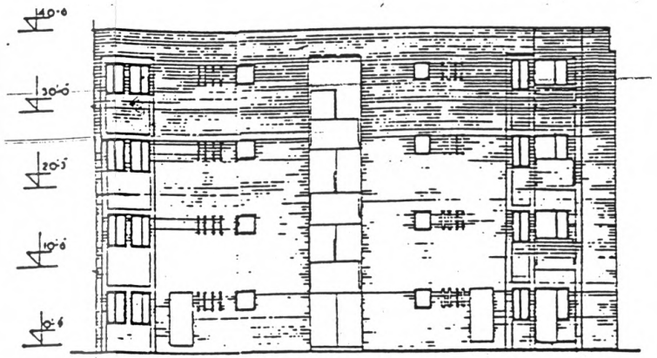
Plot Size: 21'-9" X 58'-6"	Total Plot Area: 1272.38 Sq. Ft.
Ground Coverage: 838.56 Sq. Ft.	Total Covered Area: 2306.56 S Ft.
Percentage Ground Coverage: 66%	Floor Space Index: 1.8
No. of Floors: 3	



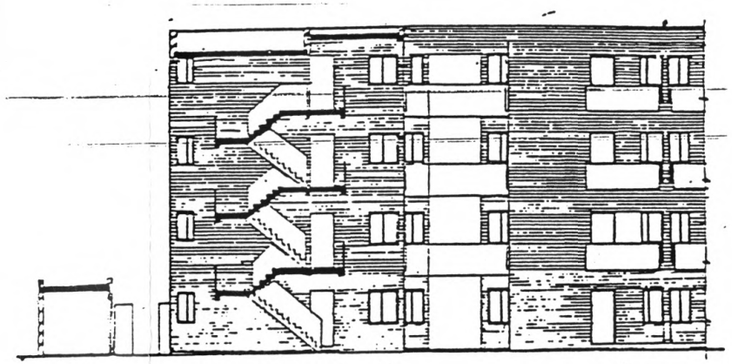
GROUND FLOOR PLAN



TYPICAL FLOOR PLAN



REAR ELEVATION



SECTIONAL ELEVATION A-A

MIG Housing Sector 44-D, Chandigarh	
Plot Size: 27' X 31'	Total Plot Area: 837 Sq. Ft.
Ground Coverage: 638 Sq. Ft.	Total Covered Area: 2278.25 Sq. Ft.
Percentage Ground Coverage: 76%	Floor Space Index: 2.7
No. of Floors: 4	

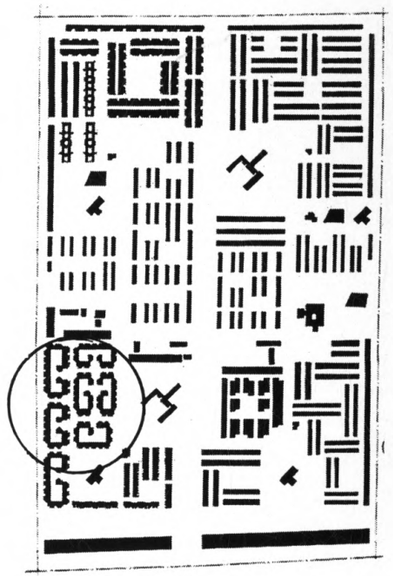
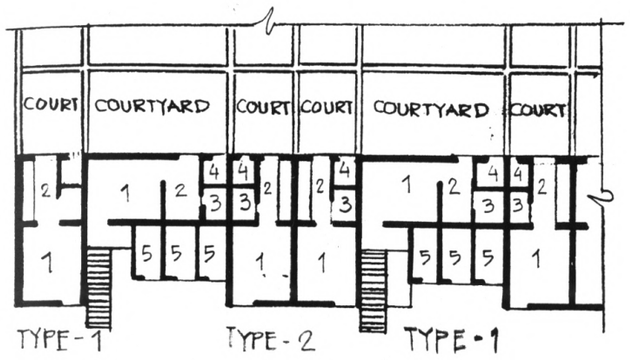
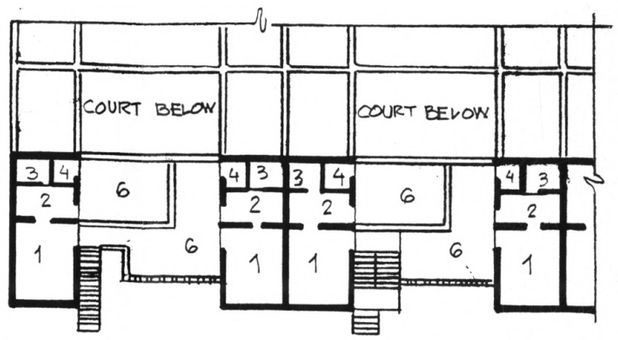


Plate 7.16 Middle Income Group (MIG) Housing by Chandigarh Housing Board.



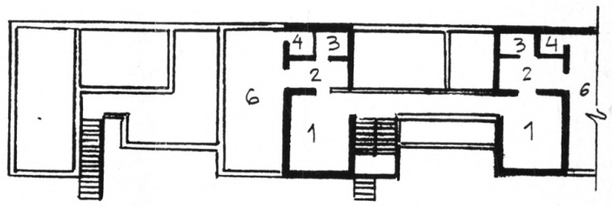
GROUND FLOOR PLAN



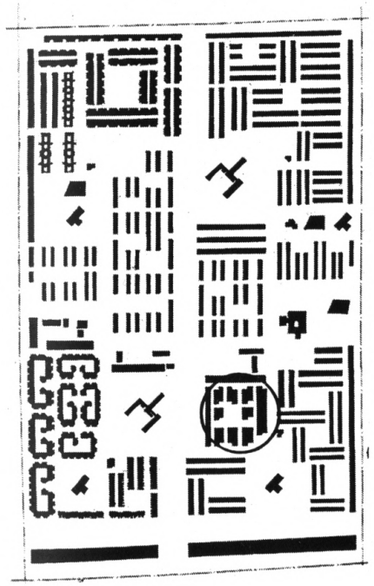
FIRST FLOOR PLAN

FRONT ELEVATION

1. ROOM
2. KITCHEN
3. BATH
4. W.C.
5. CYCLE STAND
6. TERRACE



SECOND FLOOR PLAN



LIG Housing, Type-1
Sector 44-C, Chandigarh

Plot Size: 21'-0" X 35'-3"	Total Plot Area: 740.25Sq. Ft.,
Ground Coverage: 488.25 Sq. Ft.	Total Covered Area: 448.25 Sq. Ft.
Percentage Ground Coverage: 66%	Floor Space Index: 0.66
No. of Floors: 1	

LIG Housing, Type-2
Sector 44-C, Chandigarh

Plot Size: 9'-9" X 35'-3"	Total Plot Area:343.68 Sq. Ft.,
Ground Coverage: 226.68 Sq. Ft.	Total Covered Area: 453.36 Sq. Ft.
Percentage Ground Coverage: 66%	Floor Space Index: 1.3
No. of Floors: 2	

Plate 7.17 Low Income Group (LIG) Housing by the Chandigarh Housing Board.

Though the units on the upper floors provide better privacy than the ground floor units, their disadvantage lies in the lack of private open spaces. The only open space is a small terrace, 6'-9" X 8'-6", which can be accessed from one of the bedrooms and so cannot be easily used by the entire family. Thus, the houses in the second phase have substantially less open spaces within the plot, forcing a different life-style on the residents who have to use public open spaces for outdoor activities.

The façade of the housing block is finished in exposed brickwork, with the RCC structure exposed to form contrasting bands of grey. There is no attention to the composition of openings or projections in the façade forming rows of bland, four-storeyed rectangular blocks tower that above the landscape of the sector.

- **LIG housing**

Unlike the HIG and MIG housing in the sector, the LIG housing is not concentrated in one part of the sector. It is distributed in small clusters in parts of sub-sector blocks 'A' and 'C'. The LIG housing (Plate 7.17) in the sector is in the form of small blocks that use a combination of single, two and three-storeyed housing units (designated as Type-1 and Type-2, respectively). The single-storeyed units are single room units with a small kitchen and a separate W.C. and bath. The bathing space is accessed from the kitchen, while the W.C. can be accessed only from the rear courtyard. Both these arrangements are very impractical. Each unit cover an area of approximately 488 sq.ft., close to the area covered by Type-13 houses in Sector 22 (which is 456 sq.ft.). But the amount of open space has been substantially decreased. While Type-13 houses had courtyards both at the front and the rear of the house, the LIG housing has only a

small rear courtyard. The ratio of the open to the built space is reflected in the percentage of ground coverage, which is 40 per cent in Type-13 by Jane Drew and 66 per cent in the LIG housing in Sector 44.

Type-2 in the LIG housing is in the form of two or three-storeyed, narrow single-room units, with a width of only 9 feet. The arrangement of rooms is the same as in Type-1, with the family room in the front and the kitchen at the back, the bathroom with the entry from the kitchen and the W.C. with entry from the rear courtyard. In the second floor unit of this house type, access to the W.C. is from the terrace formed by the Type-1 single-storeyed unit, while for the third floor, access is from the terrace of the Type-2, two-storeyed block. Thus, there is sharing of terraces within adjoining units. The Type-2 units have considerably less area (227 sq.ft.), which is almost half that of Type-1 (488 sq.ft.). The ground floor units have a small courtyard in the back, while the upper units rely on shared terraces for open space.

The LIG housing has more variety in façade than the HIG or MIG housing in the sector. The varying heights of adjoining blocks result in an interesting terrace pattern, which is accentuated by the perforated screen parapets. The exterior is in exposed brickwork, which is not of a very good quality. Economy of material is achieved by using standard door and window sizes. Housing is grouped around green spaces, which serve as public open spaces.

In general, the quality of housing in Sector 44 has fallen below the standards set in the Phase I housing, especially when it is compared to the housing by Drew, Fry and Jeanneret in Sector 22. While the density of housing and population has increased marginally, the quality of life and interior spaces provided has decreased substantially.

Most of the housing is provided with small, cramped interior spaces that are organized with little attention to their purpose or layout. The amount of open space within the plot has decreased substantially, resulting in a higher floor area ratio. The aesthetic appeal of such housing in Phase II is much lower than that of Phase I housing, which has more variety.

Socially, the major improvement seen in Phase II housing is the enhanced opportunity for social interaction. The community open spaces are used more than those in the Phase I housing blocks, mainly due to decrease in private open spaces. Higher density and clustered housing also contribute to increased use of open spaces.

Private Housing

Private housing in the sector is on plots with area ranging from 1 *kanal* (500 sq.yards) to 5 *marlas* (125 sq. yards). Different plot sizes (1 *kanal*, 10, 8, 7.5, 6 and 5 *marlas*) are concentrated in different parts of the sector. Table 7.3 gives a complete break-down of private housing in the sector. Most sub-sectors have a mix of private and Chandigarh Housing Board housing. This is a variation from the layout in Sector 22, where there is a complete segregation of government and private housing.

Private housing is still governed by rigid frame controls, which have remained almost unaltered. Except for the 1 *kanal* houses, the rest of the housing is in terrace formation (Fig.7.27), with the rear façade having a series of *jaalis,* in prescribed design, to serve as parapets. The *jaalis* (Fig. 7.28) are intended to serve as visual barriers, while ensuring that light and air filters through. But the residents do not seem to be satisfied with the level of privacy the *jaalis* provide and have blocked them with bricks or mortar.

TABLE 7.3
Plot Distribution in Sector 44

Sector No.	1Kanal (500sq.yds)	10Marlas (250sq.yds.)	8Marlas (200sq.yds.)	7.5 Marlas (187.5sq.yds.)	6Marlas (150sq.yds.)	5Marlas (125sq.yds.)	Other
44-A	21	0	0	109	0	0	Army Welfare Housing, HIG Flats, High Flats
44-B	0	347	68	0	90	0	R.B.I Housing, High Flats
44-C	0	0	0	267	0	186	LIG Flats
44-D	0	0	0	0	0	0	MIG Flats

Fig. 7.27 Terracing in the rear façade of Phase II houses.

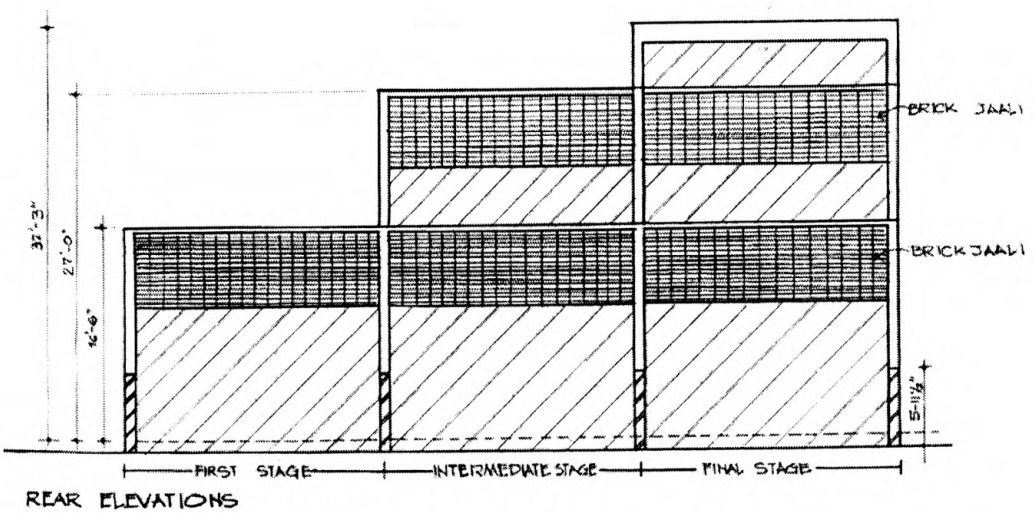


Fig. 7.28 The rear façade is required to have brick *jaalis* as parapets of a prescribed design, according to frame controls.

The facades of private houses in Phase II show an improvement over those in Phase I, with more variety in composition of elements within the building frame. In many instances, facades of houses are adorned with colored stone or have balcony projections in a variety of shapes and sizes. Door and window openings have become less standardized and are designed in a variety of shapes, such as arches, circles, polygons and rectangles with bevelled edges. There is a significant increase in surface decoration, some of which is not in accordance with of the frame controls. There is more experimentation in the façade composition as compared to Phase I sectors. One reason for this is the increased architectural awareness in the majority of the population of Chandigarh. This is mainly because of the increase in the educated and working population of Chandigarh, who are more conscious of architectural aesthetics and the need for innovation, than were the displaced refugee population that occupied a majority of small and medium sized plots in Phase I sectors.

There is an increased concern for privacy and security in the small sized plots, considering the low height boundary wall, narrow streets, and increased crime rate in the city. Some of the counter measures employed are the provision of iron grilles above the boundary wall, the planting of trees and bushes in the front yard and blocking the *jaali* openings.

Though the Administration has tried hard to regulate the cornice line and building line of the city's housing by means of the frame controls, the goal has not been totally achieved. The cornice line in Sector 44 is jagged with adjacent houses having different number of floors (Fig. 7.29). A major change in the controls for Phase II sectors, was the increase in the allowable number of floors from two to two and a half. While in Phase I

sectors, only a maximum of two families were allowed per plot, in Phase III the limit was increased to three families. This has resulted in a higher density in Phase II sectors. To compensate for the increase in density, the allowable covered area on the plot has also been slightly increased, resulting in more spacious interiors. The authorities have also allowed the construction of an extra room in the rear courtyard with a temporary roof (Fig. 7.30). In spite of these changes, there are still a few encroachments on the open space within the plots. Most of them are in the form of enclosed balconies and verandahs and covered parking spaces in the front courtyard. Another kind of encroachment is the use of residential space for commercial activities because of the increased cost of land in the commercial zone of the sectors.

In general, the aesthetic and design quality of private housing has improved in the Phase II sectors, while that of government housing has dropped considerably.

Fig. 7.29 The uneven cornice line of Sector 44 houses.

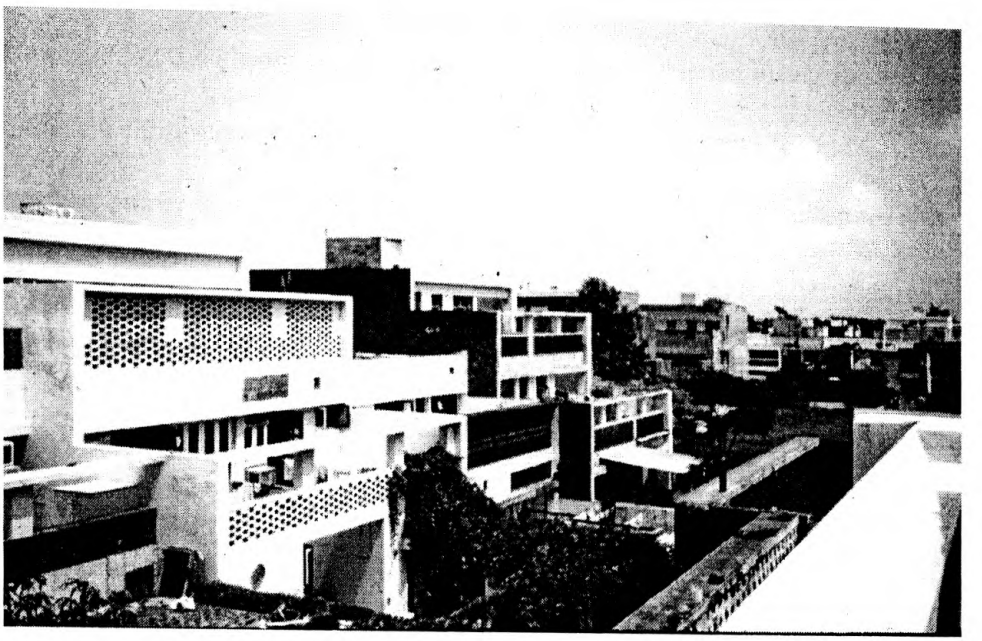


Fig. 7.30 An extra room is allowed in the rear courtyard of Phase II houses.

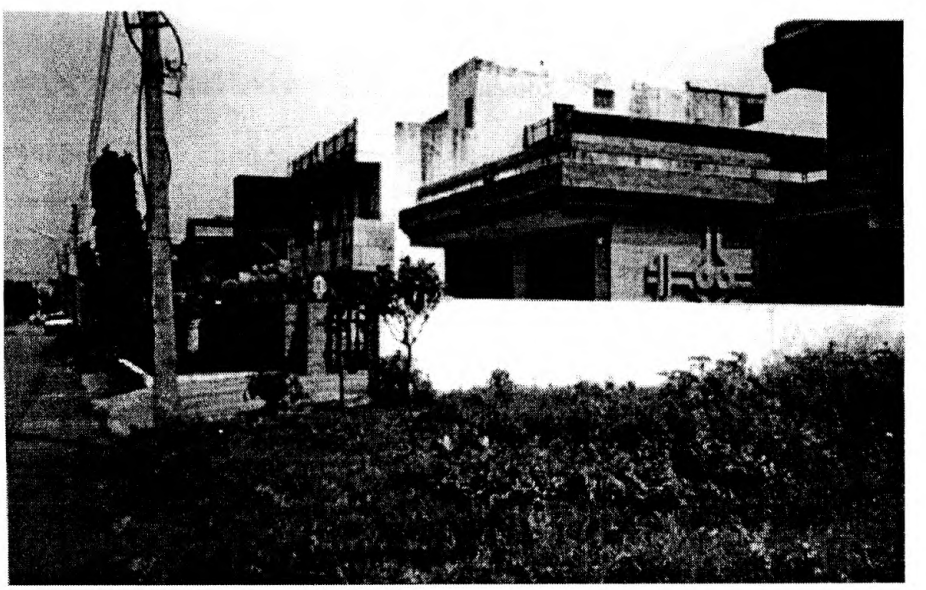


Fig. 7.31 Private housing on 1*kanal* plots in Sector 44.

2. COMMERCIAL DEVELOPMENT

Commercial development in the sector is divided between along the V3 boundary road and the V4 shopping street. The commercial space along the V3 road is in the form of three to four-storeyed blocks designed in accordance with architectural controls that regulate commercial development along all the V2 and V3 roads in Chandigarh. These four-storeyed blocks consist of offices, banks and business spaces. They generally do not have retail shops. The retail trade is concentrated in the V4 shopping street, which is more accessible and safe for the residents. The shopping area is designed in a combination of single-storeyed booths and multi-storeyed shop-cum-office and shop-cum-flat units. The shopping area is divided into three segregated pockets (Fig. 7.32) along the V4 street, breaking the linear continuity of the street. Each pocket has the single-storeyed booths on the front, defining a parking piazza. The booths are single bay shops, with a covered walkway on the front. They house only small businesses and retail shops. Larger businesses and retail showrooms are provided in the multiple bay shops in the three-storeyed SCO and SCF blocks. Most of these are placed at the rear of the piazza.

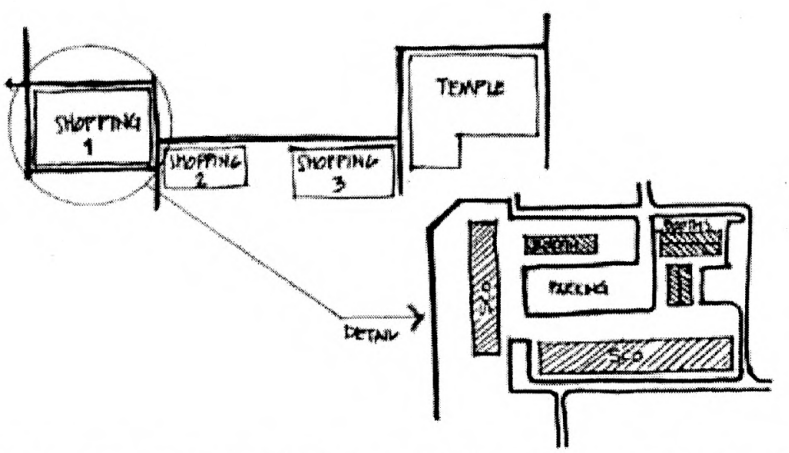


Fig. 7.32 The shopping area is divided into three pockets, and have a combination of single-storeyed booths and three-storeyed SCO and SCF units.

As in the Phase I sectors there is not much attention paid to the provision of informal markets. As a result, several street vendors, hawkers and peddlers encroach upon open spaces in the shopping areas. In many instances, such activities are also carried out from unused open areas within the sector housing blocks or from street-side pavements.

In general, the shopping areas in the Phase II sectors, still lack visual character. The shopping experience of traditional Indian bazaars, with the colorful, vibrant streets, is missing. Instead there is a mechanical uniformity that reduces the role of the shopping experience as a leisure activity.

3. OPEN SPACES

From a comparison of the figure/ground plans of Sector 22 and Sector 44, it is clear that the extent of open spaces within the Phase II sector has decreased from that in the Phase I sectors. In spite of this decrease, there is still a substantial amount of open spaces lying in a state of neglect. In a few cases, these spaces have been converted into squatter settlements with temporary shelters called *jhuggis* (Fig. 7.33). Other encroachments on unused land include, semi-permenent shops (usually occupied by washermen, barbers and vegetable vendors) and the construction of small religious shrines. In the group housing localities, the open spaces are better maintained, mainly because of frequent use.

Fig. 7.33 A squatter settlement with *jhuggis* in an open area in Sector 44.

4. EDUCATIONAL, HEALTH, RELIGIOUS AND OTHER ESSENTIAL SERVICES

The sector is provided with several services required to assist in daily life. As in Phase I sectors, there is great emphasis on the provision of educational facilities. This has resulted in a high literacy rate of 78 per cent in Chandigarh (as compared to the all India figure of 52 per cent).[174] Sector 44 has a primary school in each sub-sector and two high schools in the central green zone. A small dispensary is also provided for health care. Adjoining the dispensary is a community center. Adequate space is allotted for religious buildings of all prominent faiths followed by the local people. This includes space for a church, a temple and a gurudwara (a Sikh temple). This ensures religious harmony and

[174] National Informatics Center. (1999). *City Profile.* [World Wide Web Page]. Available: http://chandigarh.nic.in/chandigarh/default.htm. June 29, 1999.

reduces instances of the illegal construction of religious shrines within the sector.[175] In general, the concept of neighborhood is preserved in the Phase II sectors.

CONCLUSION

In Phase II sectors, there seems to be an increased tendency towards the grouping of houses on the basis of both occupation and income. This trend follows the social grouping of *mohallas* in traditional North Indian cities, based on occupation, caste, religion and ethnicity. This is becoming more common with the categorization of the Chandigarh Housing Board and other co-operative housing on the basis of income level. Thus, groups of these housing blocks are in the form of miniature *mohallas*, the difference being in the built fabric of the two. While the mohallas in old cities had an informal arrangement of houses and open spaces, the housing blocks in Chandigarh have a formal and more organized layout. Also, because of the growth of industry and commerce in the city, there was an increased need for group housing for workers, leading to an increase in occupational grouping.

The number of categories in government housing was reduced from fourteen to five (HIG, MIG, LIG, EWS and Sites and Services Scheme). This has resulted in increased uniformity in both the sector and city profile. The average size of housing plots has decreased due to the escalating cost of land and the increasing population of the city. There are no plots over 1 *kanal* in the Phase II sectors, but the allowable covered area has increased from 55 per cent to 60 per cent. This has resulted in a simultaneous decrease in

[175] According to Chief Architect S.K. Midha, one of the pressing problems within most sectors is the illegal construction of religious shrines on empty pieces of land. The administration faces problems in getting rid of such illegal development, mainly because of the association of religious sentiments of the majority of people, with such shrines.

open space. Also, the number of allowable floors has increased from two in Phase I to four in Phase II, resulting in an increase in density. While the density of sectors has increased, the infrastructure provided is the same, thus straining resources.

The quality of government housing in Phase II sectors has declined due to the increased cost of construction and building materials and the need to provide subsidized housing. Contrary to this, the standard of private housing has risen, with more attention to design and aesthetics. Facades of private houses in Phase II sectors, in general, have more variety than those in Phase I sectors. Presently, a large number of houses in Phase I sectors are either being renovated or are being reconstructed to express the aspirations of the occupants.

Most of the frame controls have remained unchanged, though they do require serious rethinking on the part of the Chandigarh Administration. According to former Chief Architect of Chandigarh, Aditya Prakash:

> *I still consider this [frame controls] a very good tool for working, but it has also to be continuously evolved, in the sense that its orientation with different situations and the variations in the same situation should be studied. This unfortunately has not been done, so the system has tended to become stereotyped; whereas I would have thought that every two or three or maximum five years a new set of control plans should be evolved which should harmonize with what exists, and at the same time give enough variety to the growth system.*[176]

Thus, there is a general consensus that the frame controls need to be reformulated in light of present day needs and aspirations.

The working class population in Phase II sector is generally more conscious of architectural trends, resulting in the application of some interesting design ideas, even

[176] Prakash, Aditya. (1987). In *Architecture+Design*, Sept-Oct. 1987, p.63.

within the constraints of the frame controls. The character of the commercial development in the second phase sectors has remained the same, resulting in similar looking, one to three-storeyed blocks in all the sectors of Chandigarh. There is a rapidly increasing number of unplanned commercial activities taking place in the shopping areas, mainly because of lack of provision for small-scale businesses and services.

The most obvious contrast between the Phase I and Phase II sectors is presented by the unplanned settlements incorporated within the urban fabric of several Phase II sectors. Phase I sectors were constructed on land that was acquired by the government and cleared of all encroachments before construction started. Over time, unplanned settlements started appearing on the fringes of the city, most of them on land set aside for Phase II construction. Most of these unplanned settlements are in the form of villages that started as squatter settlements occupied by the labor involved in the construction of Chandigarh. As the city grew, poor people from rural areas started migrating to the city to seek work opportunities. Most of them took up residence in these peripheral settlements. As a result these unplanned settlements became densely inhabited and are today firmly established in the city. The city presents an interesting paradox between the geometrically planned layout of the sectors and the haphazard development typical in these urban villages, and amazingly, both coexist.

STUDY OF A PHASE III SECTOR

SECTOR 61

Sector 61 lies in Phase III of Chandigarh, which covers Sectors 48-61. The Chandigarh Administration is still in the process of acquiring land demarcated for these sectors. Hence, most of the Phase III sectors are not under construction as yet. The administration is experiencing considerable delay owing to the existence of unplanned settlements on most of the Phase III land.

Due to increased pressure on land and the growing need for housing, Phase III sectors have no individual plots and are proposed to have only multi-storeyed housing. Most of the land is being auctioned off to the Chandigarh Housing Board and other co-operative housing societies such as P.S.B. Officers Housing Board Society and the P.G.I. Employees Housing Board society. Such an arrangement will lead to increased segregation on the basis of occupation. The sectors also consist of several rehabilitation colonies for the squatter population of Chandigarh. The Phase III sectors are thus, mainly high-density, middle to low income sectors.

MORPHOSTRUCTURE

A major part of Sector 61 (Fig. 7.34) lies in the adjoining state of Punjab, in Phase-VII of Mohali. Only a small part of the sector falls in the boundary of Chandigarh City. The part that lies in Chandigarh is a high-density district with only three-storeyed middle income group (MIG) housing blocks built by the Chandigarh Housing Board. The part that lies in Mohali is a high-density district with a combination of 1 *kanal* and smaller *marla* plots. The layout of the sector is strongly geometric and follows the pattern

of roads in Phase I and II sectors. The main difference is that the V5 loop road in Sector 61 is not very well defined and is difficult to differentiate from the V6 roads within the sector. Thus, the hierarchy of the road system within the sector is obscure, except for the clearly distinguishable boundary roads and the V4 shopping street.

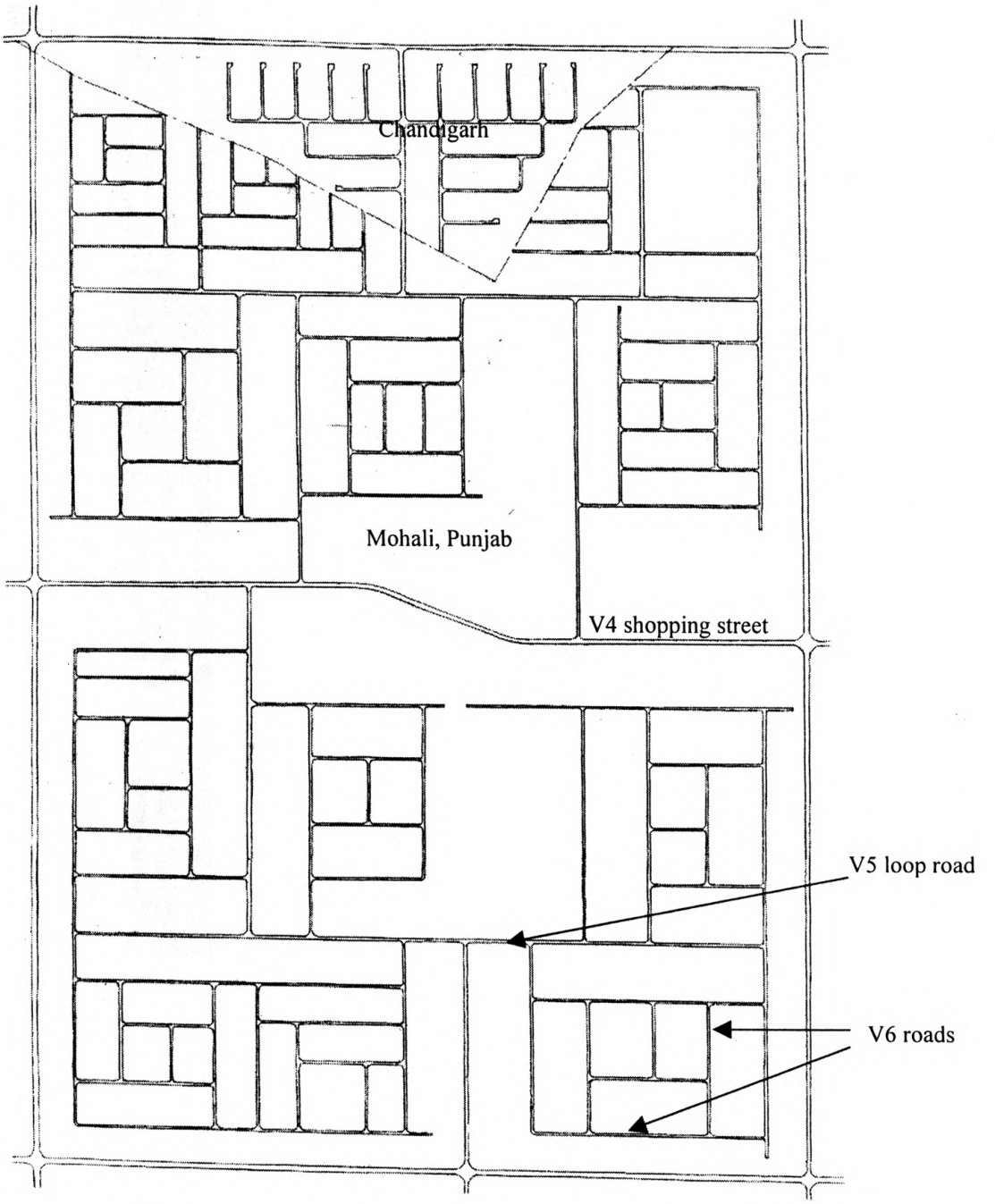
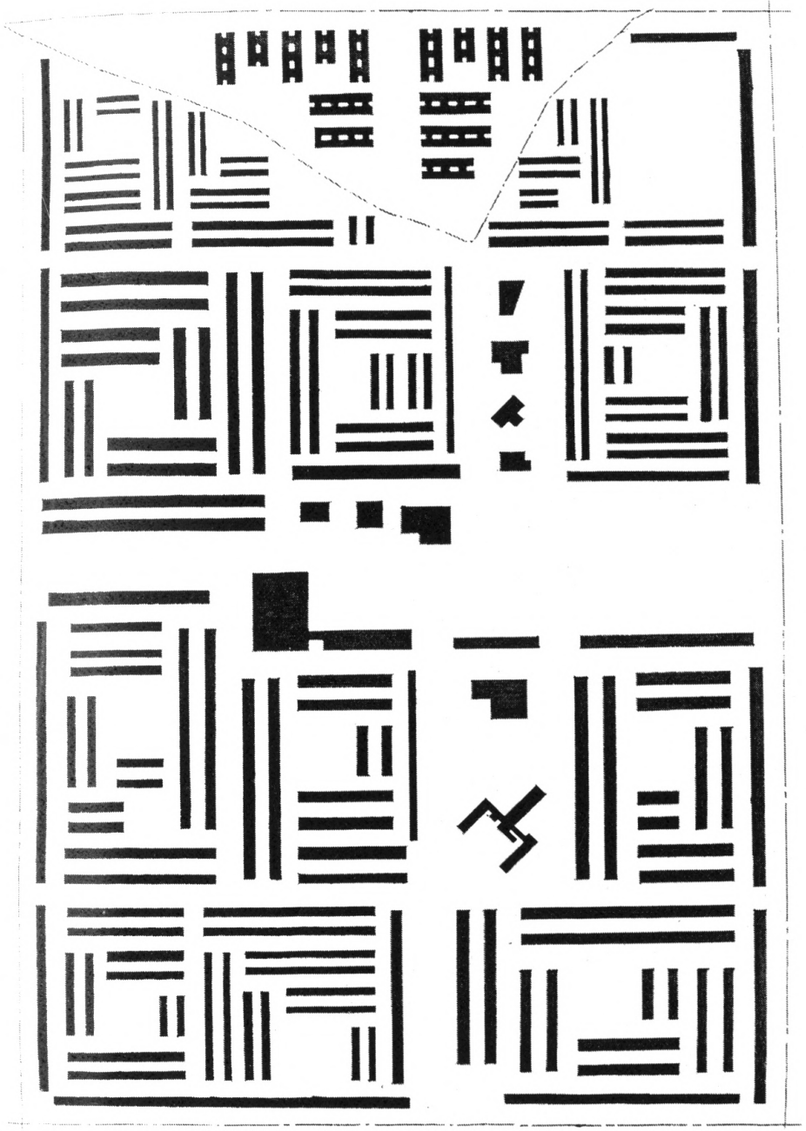


Fig. 7.34 The road layout of Sector 61, Phase III of Chandigarh.



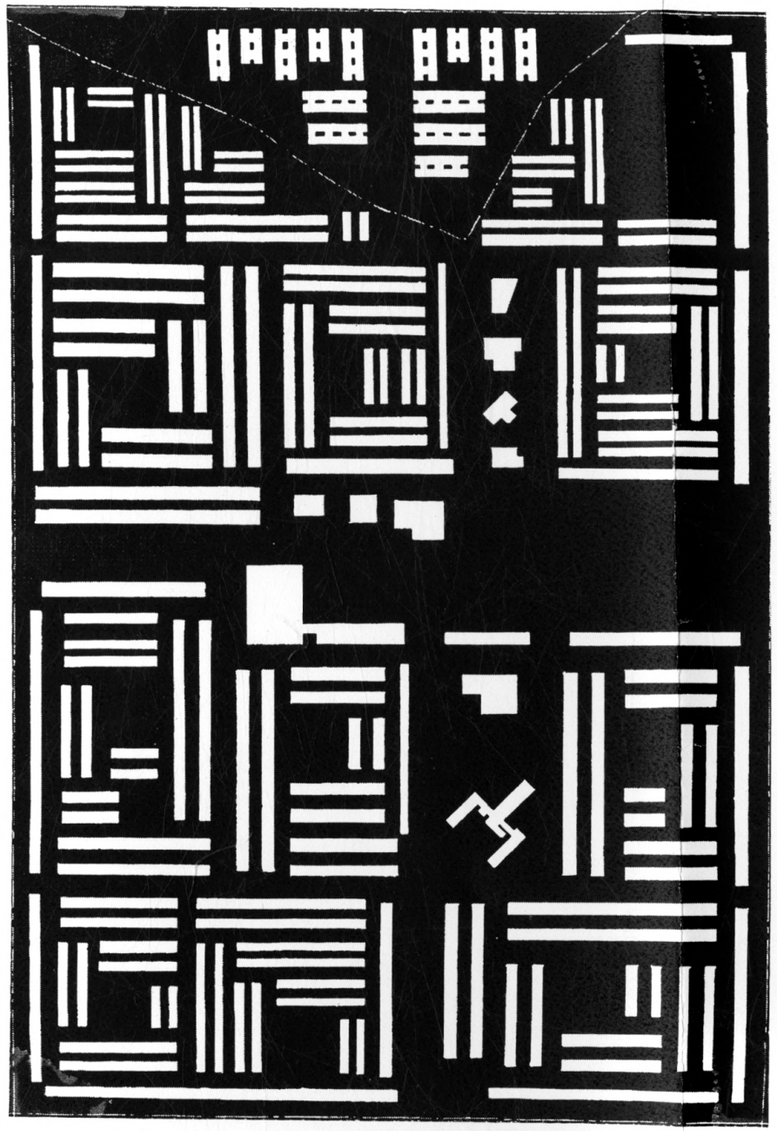


Plate 7.18 Figure/ground plans of Sector 61.

From the figure/ground plans (Plate 7.18) of the sector, it is evident that the extent of open space has decreased considerably. The central green zone is reduced to a narrow, discontinuous strip that has no significant parks or playgrounds. The most prominent open spaces in the sector are the green squares around which housing blocks are arranged. There are fewer incidental open spaces in the sector, because of substantially higher land utilization. From the footprints of built up areas, it is clear that they are arranged at right angles to maximize the usage of land. The MIG housing blocks in Sector 61 (Chandigarh) are linearly aligned, with small public open spaces , between adjacent units.

Most of the Phase III sectors are not complete as yet, making it difficult to anticipate their pattern and layout. In the parts constructed so far, there is not much improvement in the structuring of the sector over the Phase I and II.

Sector 61, is one of the first sectors constructed in Phase III of Chandigarh. While the majority of the sector area lies in Mohali, it is the part that lies in Chandigarh, which is important for completing the study of the three phases of Chandigarh. Thus, a detailed study of only this part is undertaken, while brief mention is made of the characteristics of the part that lies in Mohali and was constructed at a much earlier date.

1. HOUSING

The housing in Phase III of Chandigarh is mainly in the form of group housing, designed as multi-storeyed apartments. The maximum number of floors permitted is still four. Such a restriction avoids the cost of elevators, which are required for buildings of more than four storeys. Whereas, the part of Sector 61 that lies in Mohali, has various

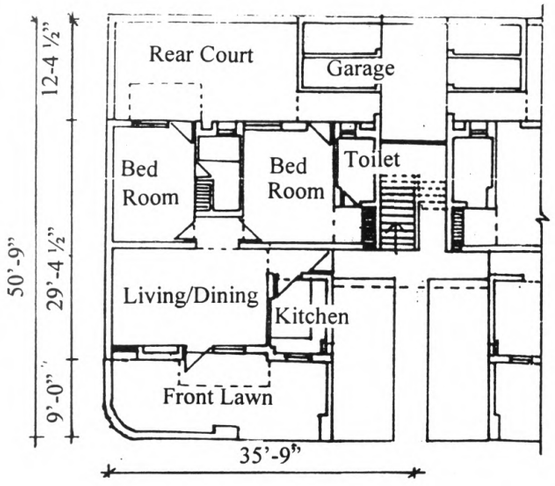
plot sizes ranging from 1 *kanal* to 5 *marlas*, the part in Chandigarh, has only three-storeyed, MIG housing blocks designed by the Chandigarh Housing Board.

Each floor of the MIG unit (Plate 7.19) has a two-bedroom residential unit, with a living room, a kitchen and toilets attached to both bedrooms. The ground floor unit have front and rear courtyards, with a covered scooter garage provided in the backyard. While the ground floor has ample open space, the upper units have only small balconies, thus making them almost completely enclosed spaces. The total covered area of each unit is around 1350 sq.ft, on a plot of size 35'-9" X 50'-9", resulting in a ground coverage of 75 percent. This is much higher than the coverage in the Phase I sectors, while being comparable to those in Phase II sectors. Rows of these units are arranged linearly, in a back-to-back arrangement. The houses are finished in exposed brickwork. Contrast is provided by exposed reinforced concrete slabs and balcony parapets. Visually, the housing blocks resemble the housing in Sector 44 by the Chandigarh Housing Board. Standardized door and window openings add to the monotony of the façade.

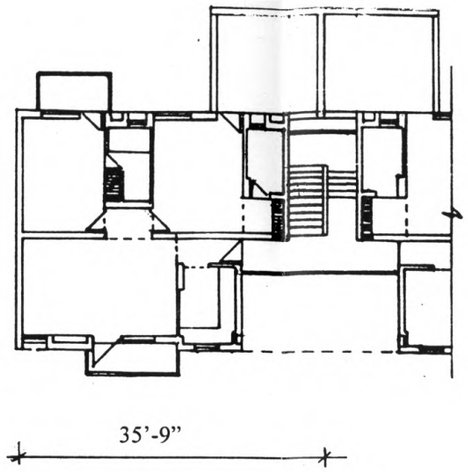
In general, the MIG housing in Sector 61 (covered area- 1350 sq.ft.) is much more spacious than that in Sector 44 (covered area - 638 sq.ft.), resulting in more interior spaces.

2. COMMERCIAL DEVELOPMENT

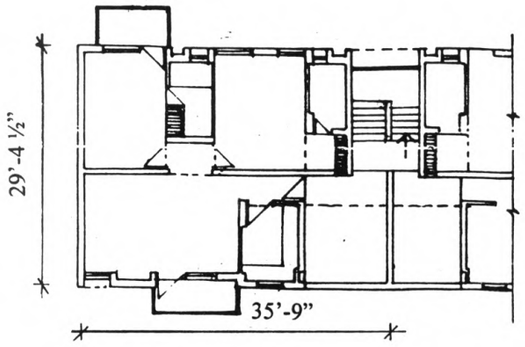
There is only one type of commercial development in Sector 61, which is along the V4 shopping street. Contrary to both Sectors 22 and 44, shops run through the entire length of the V4 street. There is no commercial development along the boundary roads of the sector. The Chandigarh part of the sector has shopping areas reserved at the east and



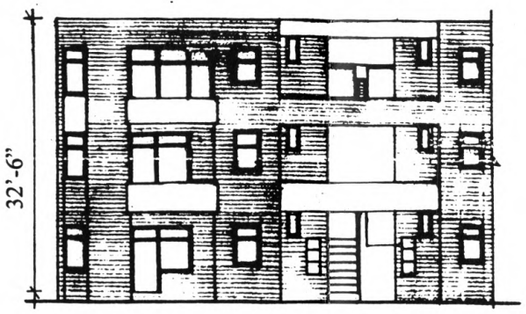
GROUND FLOOR



FIRST FLOOR



SECOND FLOOR



FRONT ELEVATION

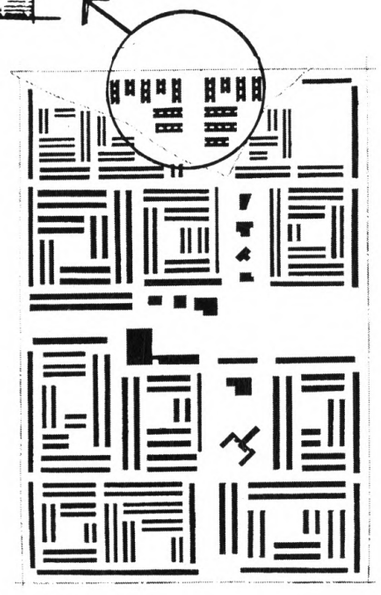


Plate 7.19 Middle Income Group (MIG) housing

0 8 16 32 FT.

Middle Income Group (M.I.G.) Housing
Sector 61, Chandigarh

Plot Size: 35'-9" X 50'-9"	Total Plot Area: 1814.31 Sq. Ft.
Ground Coverage: 1349.03 Sq. Ft.	Total Covered Area: 3759 Sq. Ft.
Percentage Ground Coverage: 75%	Floor Space Index: 2.07
No. of Floors: 3	No. of Units in One Block: 3
Materials: Brick and Concrete	

facilities. With the increase in the use of motor vehicles, commuting within the city has become easier. This has led to a decreased interest in providing all daily use facilities in each sector. There is more of an inter-dependance between nearby sectors. This leaves more area for housing, which is still proving to be insufficient in meeting the demands of the growing urban population of the city.

In the Chandigarh part of the sector, no public facilities have been provided as yet, though small pockets of land have been demarcated for future development. Thus, for now, the residents depend on the part of the sector in Mohali and on adjacent sectors in Chandigarh, for daily use activities.

CONCLUSION

In Phase III sectors the basic structure of the sector has remained the same, with a similar hierarchy of V3, V4, V5 and V6 roads. There has been a change in the built fabric of the city, which is denser than the Phase I and Phase II. The skyline of Phase III sectors is to be formed of two to four-storeyed housing blocks designed by housing societies. The main concern in these sectors is to house the burgeoning population of the city. There is little attention paid to sociability, user needs, aesthetics or quality of construction. Chandigarh seems to following the trend of most post-war industrial cities, where quantity and not quality was the concern.

It is ironic that Le Corbusier's idea of multi-storeyed housing blocks at the fringes of the city[177], which was rejected earlier, has now been adopted as the only feasible solution.

[177] Such an inclination on the part of Le Corbusier is suggested by Maxwell Fry in his writings. Fry remarks, "There was an episode that I have never been able successfully to explain, which concerns the

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COMPARISON OF THE THREE SECTORS

From a description of a sector in each phase of Chandigarh it is clear that the city had undergone several changes that were necessitated by the growth of the city and by the changing social, cultural and economic conditions.

While the broad geometric structure of the sectors remained the same in all three phases, the components, mainly the housing and open spaces, underwent several changes. The factors responsible for these changes can be divided into two broad categories.

- **Social and cultural conditions**

In the first phase of Chandigarh, the majority of the population of the city consisted of refugees from the partition of India and of state government employees. The sector organization was based on no definite social grouping except for the economic standing of the resident.[178] This was radically different from the social organization in traditional Indian cities, which is predominantly based on caste, religion, kinship or occupation. In the first phase, plots were allotted randomly and the residents did not have the opportunity to determine who their neighbors would be. Thus, there was not much opportunity for segregation on any particular basis, except for economic status, which was ensured by grouping together plots of similar size, ranging from 2.5 *marlas* to 8

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distribution of population over the plan sectors. We had accepted as unshakable and inevitable the hierarchic disposition of the population from rich to poor, downward from the Capital, and we could with no greater difficulty have distributed the total of 150,000 over the plan. But Corbusier with some secrecy worked feverishly on a sort of computerization, some system he had in his mind, that would present us with the mosaic law of the matter, and somewhere in this computation was the hint of a row of high-rise buildings down in the plan. They never rose...I only know that the incomprehensible figures were not to my knowledge applied to the plan, which it was clear from the beginning was to be a poor state's capital in two dimensions, with no two-grade intersection in our lifetime."
Quoted from: Fry, Maxwell. (1977). *Le Corbusier at Chandigarh.* In *The Open Hand, Essays on Le Corbusier.* Russell Walden (Ed.). Cambridge: The MIT Press. p.358.

[178] This view is reinforced by data collected by Victor D'Souza from a survey of the first phase sectors, where no apparent segregation on the basis of kinship, caste, class, or religion, was found.

kanals). In the subsequent phases of Chandigarh, there was an increased tendency for social grouping based on the occupation of the residents. The socio-spatial organization of the sector is still predominantly based on economic grouping (Fig. 7.35). The upper rows of sectors house the elite of the city in private residences on plot areas greater than 1 *kanal*. The last row of Phase I sectors and the first row of the Phase II sector houses the middle-income population of the city. They occupy either private houses on plots with area less than 1 *kanal* or government housing on smaller plot sizes. The last row of Phase II sectors and all the Phase III sectors, consist mostly of group housing schemes designed by the Chandigarh Housing Board. These house mostly the middle to low-income level population. Predominant in the southern parts of the city, are urban villages and rehabilitation colonies for the slum dwellers, who also inhabit several squatter settlements on the periphery of the city.

The social and cultural conditions of the city have changed dramatically since its conception. To some extent this change can be attributed to the political changes associated with the city. With the change in the political status of the city to become a Union Territory[179], and the joint capital of the neighboring states of Punjab and Haryana, it has become predominantly an administrative city. At present Chandigarh houses three different governments. This has led to a substantial increase in the population of administrative workers in the city who form 48.4 per cent of the city's working population.[180] Chandigarh has also grown as an important center of education, trade and commerce in the region, leading to a further increase in the working population of the city. According to the 1991 Census, 33.9 per cent of the population of the city constituted

[179] A Union Territory is under direct control of the Central Government, making it an independent entity, free from control by any state authority.

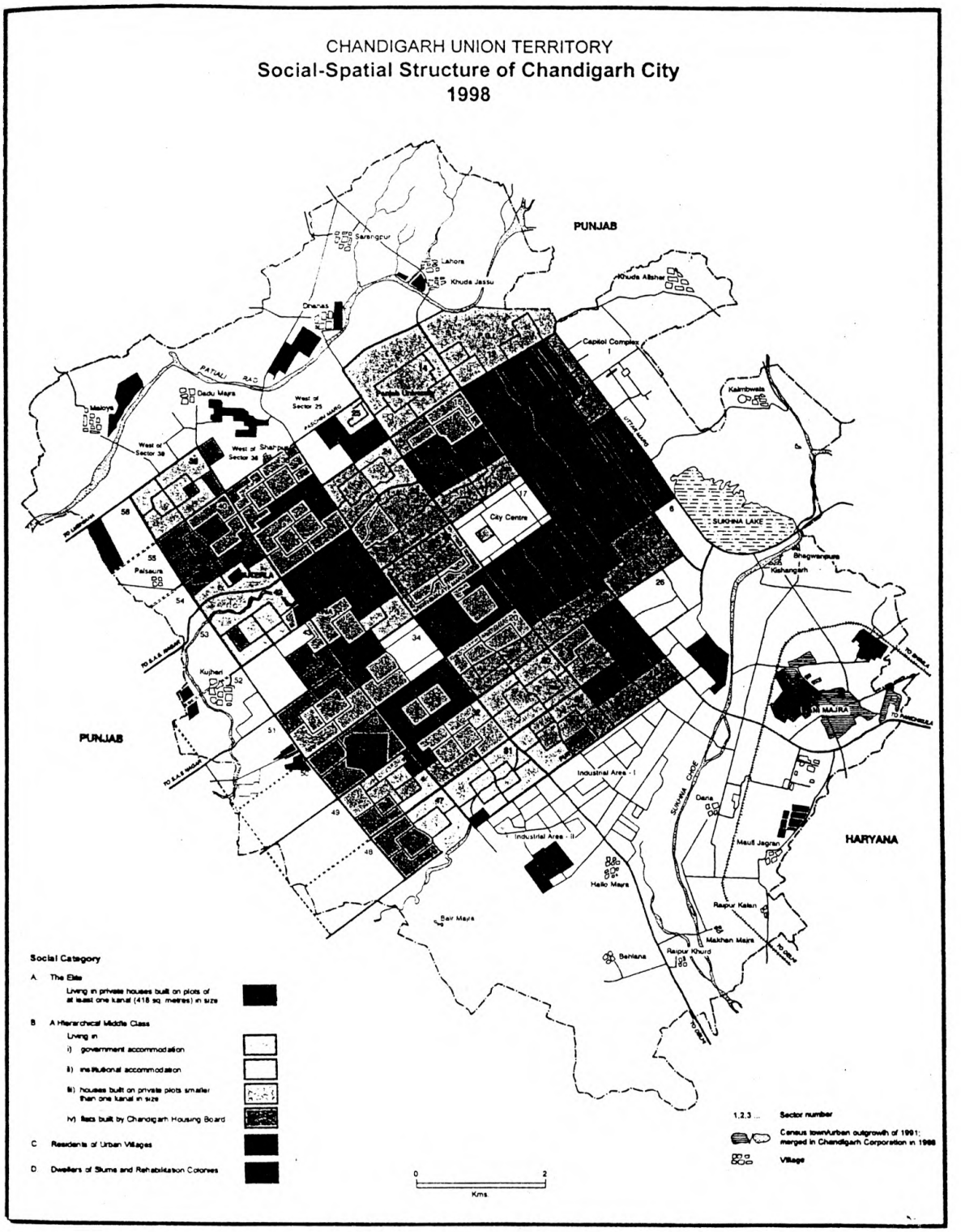


Fig. 7.35 The socio-spatial organization of the city is based on economic grouping of the residents

[180] *Krishan*, Map 9.

workers, much higher than 29.5 per cent for urban India.[181] Thus, a substantial amount of the population of the city works, with most of them traveling a considerable distance to their work place. This leaves them with less time for social and leisure activities, thus restricting social interaction with neighbors. This is one of the reasons contributing to a lack of social interaction visible in the city, which cannot be attributed solely to the particular spatial layout of the city. Lack of social interaction in Chandigarh has also resulted in the labeling of the city dwellers as aloof and snobbish. For the small amount of leisure time the inhabitants have, they prefer to go out of their own sector for leisure activities, further weakening the role of the sector as a social space. With increased use of motor vehicles, the majority of the population is not bound within the sector and hence prefers to travel to stronger activity nodes such as the City Center or the Sukhna Lake. The concept of inward-looking sectors has been cast aside by a population that prefers to consider the city as a whole, instead of an agglomeration of individual, self-contained sectors.

- **Political and economic conditions**

A few years after the conception of the city, the political base of the city underwent a series of changes that had a dramatic effect on the development of the city. The first was the merger of PEPSU[182] with Punjab, which led to an increase in the administrative load on the city. It resulted in the increased momentum of government housing in the city. The next change occurred in 1966, when Punjab was divided to form another state called Haryana and the status of Chandigarh was changed to that of a Union

[181] *Ibid.*
[182] Several princely states of the region.

Territory, under the direct control of the Central government. The city, thus, became a triple capital, resulting in an unexpected spurt of physical growth. There was a simultaneous growth of the city as an important commercial and industrial center of the region. While this led to the strengthening of the economic base of the city, it also resulted in population growth.

Both these developments were responsible for the tremendous urban population growth rate of 81.52 per cent for the years 1971-81, much higher than any other city in India. This necessitated an increase in the density of the city, resulting in smaller plot sizes and increased vertical development in Phases II and III of the city. The population increase also resulted in the growth of unplanned peripheral settlements. The Phase II and Phase III areas have several of these unplanned settlements in the form of villages and squatter settlements, incorporated within the sectors (Fig.7.36). In spite of the efforts of the administration to provide cheap, subsidized housing to the low-income population of the city, the houseless population of the city continues to grow.

In contrast to this, the upper class of the city has continued to improve its fortunes. The average middle-class standard of living has risen. In some cases, the rising fortunes of the inhabitants has resulted in the ostentatious show of wealth, represented in the garish, highly ornamental architecture of sprawling mansions and the loudly decorated facades of houses on smaller plots. Improvement in the economic standard has also presented an opportunity for experimentation and design innovation, resulting in instances of interesting residential architecture with strong aesthetic quality. The increased literacy rate has also increased architectural awareness in the average resident of the city, ensuring better architectural quality. There is also an increased awareness of

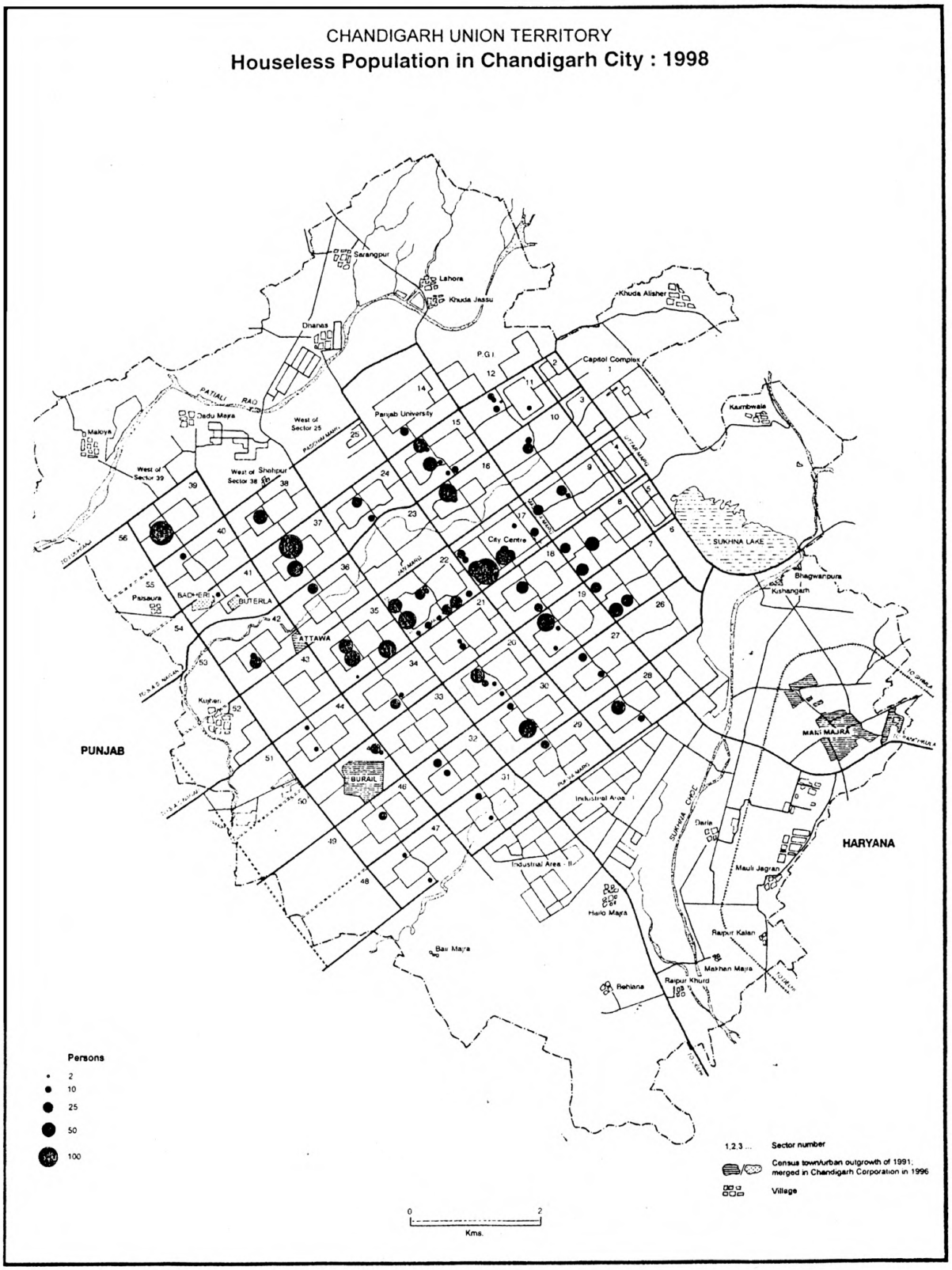


Fig. 7.36 Existing villages and squatter settlements incorporated within the sectors in Phase II and III.

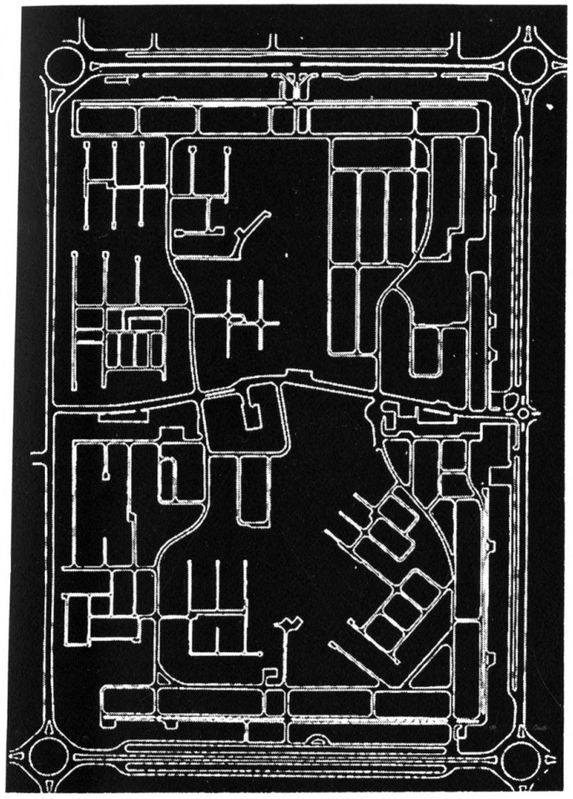
the architectural heritage of the city, prompting increased concern about the fate of the city. The pressure from the inhabitants of the city to improve the conditions in Chandigarh has prompted the city administration to envisage future proposals for the growth of the city and to also rethink the various controls governing development in the city.

All these factors have resulted in several changes in the essential components of the city. These can be discussed under the following categories, which can be generalized for all sectors.

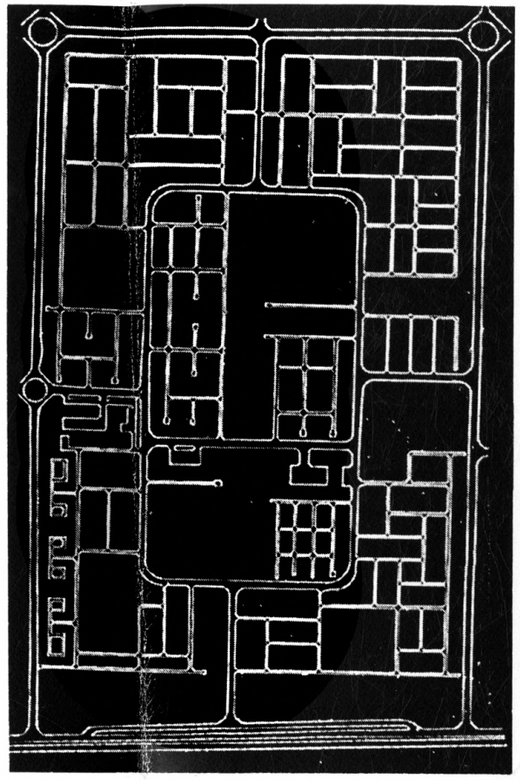
1. FORMAL STRCUTURE OF THE SECTORS

The formal structure of the city is based on the circulation system of the city defined by the seven V's. The basic hierarchy of the road system has been preserved in all three phases of Chandigarh. The differences observed lie in the way the various elements structuring this layout are detailed, mainly the internal roads.

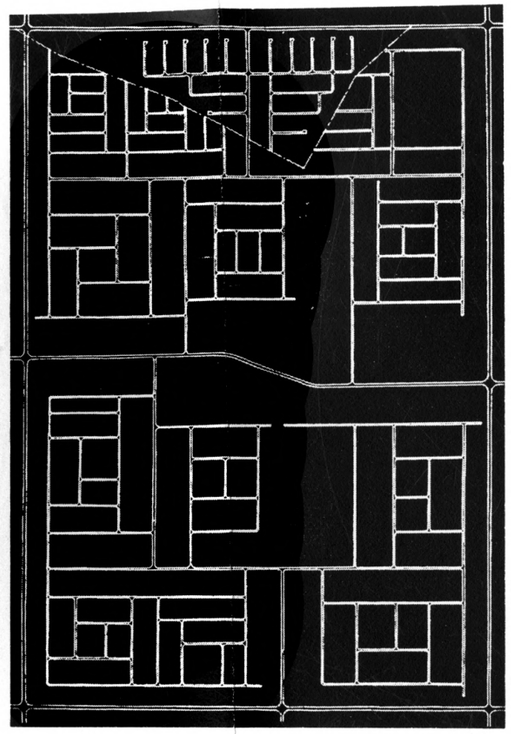
The layout of the first phase sectors was carefully worked out for each sector, with attention to small details, such as a slight curve in the road to accommodate an existing tree or road. This resulted in slight variations in the layout of different sectors in Phase I. In the Phase II and III sectors, the internal layout has become more standardized and there is less attention to providing variation among sectors. From a comparison of the three sectors, it is clear that the road layout in Sector 22 is less rigid than in sectors 44 and 61 (Plate 7.20). There is more attention to slight twists and turns as dictated by the housing blocks and by existing features on the site. In Sector 44, the V5 loop road is



SECTOR 22



SECTOR 44



SECTOR 61

Plate 7.20 Comparative road layout of Sectors 22, 44 and 61

perfectly rectangular, resulting in a more formal geometry. The same pattern is observed in the layout of V6 roads in the two sectors. In Phase III there seems to be more variety in internal layout because of the presence of urban villages. In some of these sectors, the loop arrangement seems to have been abandoned in favor of a more flexible layout of roads.

An interesting feature in Sector 22 is the presence of service alleys between rows of housing, which are not found in Sector 44 and 61. The service alleys provide useful parking spaces and also result in additional privacy for the rear courtyard, which are now sufficiently distanced from the adjoining row of houses. Such an arrangement shows attention to provision of services within housing blocks, which, in this case, were segregated from the main streets. There are no service alleys in Phase II and III sectors. One reason for their absence is the lack of land area and the other is the increasing degradation of the existing alleys into dirt roads and their use as garbage disposal spaces.

One criticism of Chandigarh in the past has been the width of the roads, which were seen as being too large for a city of the size of Chandigarh.[183] While such a criticism may have been valid at the time the city was built, today, some of these wide V2 and V3 roads are proving to be too narrow for the increasing vehicular traffic in the city. Le Corbusier's foresight in this aspect of the design of Chandigarh is commendable. Though, the traffic network defined by the Seven V's still persists, one idea that is being increasingly abandoned is the provision of traffic roundabouts at the junction of important roads. The roundabouts meant to ensure an uninterrupted flow of traffic, today create chaos and confusion with the increased vehicular traffic. In view of the congestion

[183] An example of such a criticism is presented by Kenneth Frampton's description of Chandigarh. *Frampton,* pp. 224-230.

and relative ineffectiveness of these roundabouts, several of them along the V2 and V3 roads have been replaced by intersections controlled by traffic lights.

Residential streets, which were initially regarded to be too wide for community interaction, are proving to be narrow in high-density areas because of increased vehicular traffic. Fast moving traffic within the sectors no longer leave the roads safe for socializing and street activities that they were meant to support.

2. HOUSING

Housing is the most important component of Chandigarh. Forming the living unit, any housing is bound to be modified with time in order to adapt to the changing needs of the inhabitants. But the various controls governing the housing design in Chandigarh, have prevented substantial changes in the layout or appearance of the majority of houses in the city. Though, there are several instances of minor alterations and additions in contradiction to the controls.

The three phases differ in the density of population and housing in the sectors. The average population density of the sector has increased from 30.61 persons per acre in Phase I to 37.65 persons per acre in the Phase II sectors. The average housing density has increased from 6.5 houses per acre in the first phase to 8.5 houses per acre in the second phase of Chandigarh. The size of housing plots was reduced considerably resulting in a more intimate scale of housing in later phases. While the largest plot size in Phase I sectors was 10 *kanals* (5000 sq.yards), it was reduced to 1 *kanal* (500 sq.yards) in Phase II and in Phase III all plots are smaller than 1 *kanal*. This progression is evident in the map showing the distribution of private plots in the city by size category (Fig.7.37).

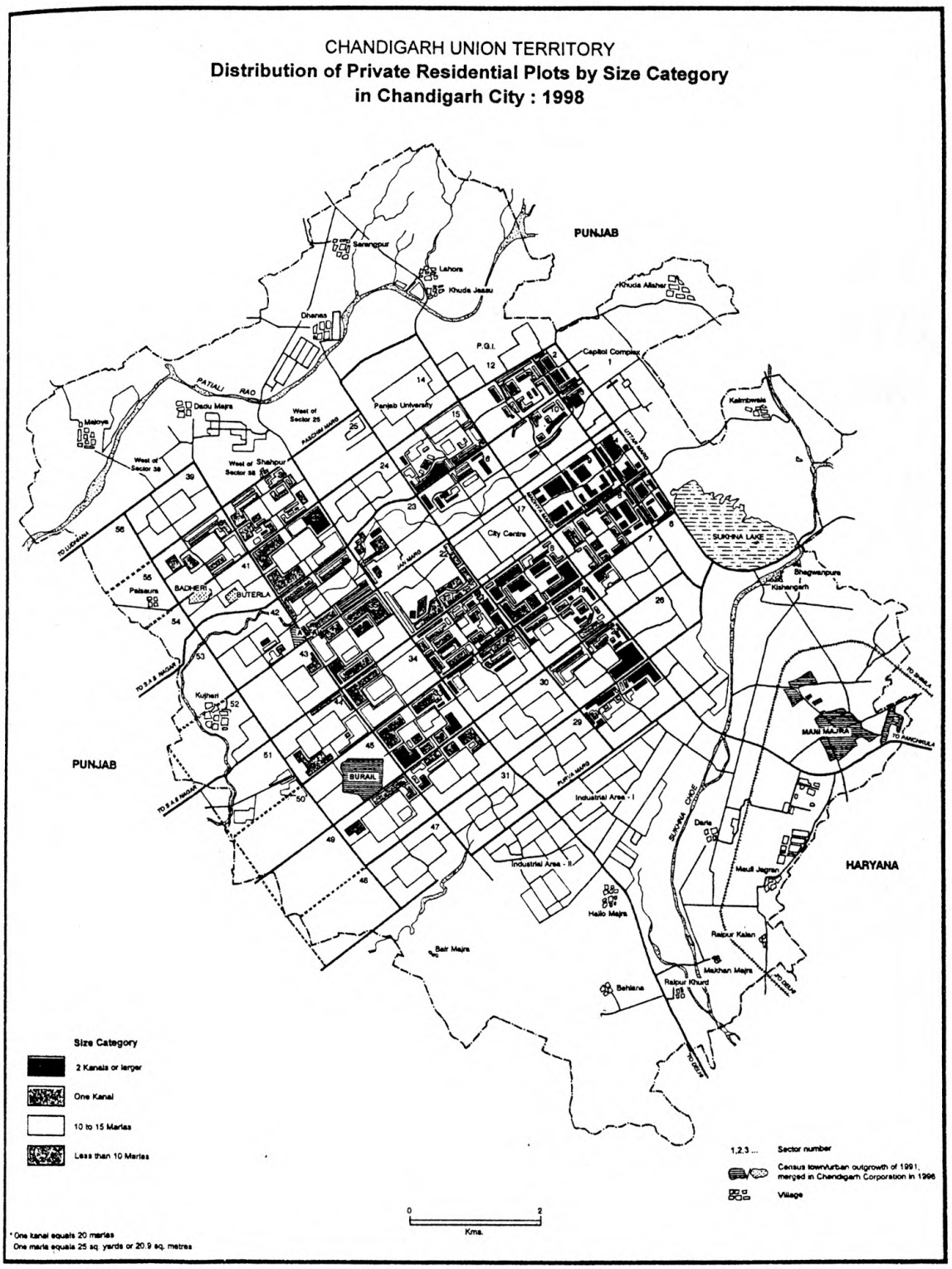


Fig. 7.37 Distribution of private plots in the city by size category.

The increase in population of the city and the shortage of land has resulted in increased vertical development in the later sectors. There is a considerable dominance of multi-storeyed housing blocks in Sectors 44 and 61. The number of permissible habitable floors on individual house plots was increased from two to three in the second phase of Chandigarh. Four-storeyed group housing schemes, built by the Chandigarh Housing Board and sold at a subsidized price, became popular in the later phases of the city.

The various architectural, frame and schematic design controls have generally been preserved through the three phases. The major change in the controls was a slight increase in the covered area permitted, and an increase in the number of allowable floors on each plot. Due to substantial cases of construction of an extra room in the backyard, the controls were revised to allow such a room, but with a temporary roof, in the rear courtyard. There were several unpopular frame controls that have been extensively defied. One of these is the use of extensive *jaalis* in the living areas, which according to the residents compromised privacy. Another was the low boundary wall in the front of the house, which in several instances has been topped by protective iron railings or hedges. These measures provided additional privacy and security for the inhabitants.

It is evident that more attention was paid to the design of housing in the first phase of Chandigarh when the city was new and the design team was enthusiastic about seeking innovative design solutions. Even the quality of construction, monitored by the design team, was much better. In the second and third phase sectors, this enthusiasm was replaced by rapid, more careless design. Economy, speed and pressing needs to house the increasing population became the driving force for the construction of later housing in the city. Somewhere along the way the spirit to build quality architecture was lost. Solutions

presented by the original design team were repeated endlessly, and coupled with the restraints imposed by the frame controls, have resulted in visual monotony in the city. Another important change was the reduction of the number of housing categories from thirteen to only five.

Changes in the design of private housing in the city include increasing attention to visual appearance. As discussed earlier, it has resulted in examples of both ostentatious as well as ingenious architecture in the city.

3. COMMERCIAL DEVELOPMENT

The extent of commercial requirement of the city has increased with the establishment of the city as a major center for trade and commerce in the region. This has resulted in increased apportioning of land along the V2 and V3 avenues for large- scale businesses, and in increased development along the V4 shopping street in the sectors.

Visually, the commercial development has retained most of its original design, which is still regulated by Architectural Controls. In general, commercial development has become more formal in the Phase II and III sectors, with less variety in façade and almost a total absence of elements such as *jaalis* and sunbreakers, which were prominent elements in the shopping areas designed by the architectural team of Jeanneret, Drew and Fry. The major change in the design of commercial areas is the abandonment of the idea of shop-cum-flat units for reasons such as cramped living spaces on the upper floors, the noisy setting and the threat to security posed by unfamiliar people having access to the premises. The main reason, however, was the need for extra commercial space, caused by lack of storage space on the ground floor, and the high demand and increasing cost of

land in the commercial zone. In several cases, the residential floors were illegally used as commercial space, until the authorities finally decided to make such a use legal. In most Phase II and III sectors, shop-cum-flats have been abandoned in favor of shop-cum-offices.

In the design of commercial areas there is an increased awareness of the need for providing larger parking lots, due to the increases in the number of motor vehicles. Sector markets are increasingly catering to specialized trades, thus providing incentive for their use by the whole city.

One of the shortcomings of the master plan is the lack of provision for small-scale businesses in the city. Small-scale businesses form an important part of the commercial activity in India and provide work opportunities for the uneducated and the poorer section of society. In the absence of any accommodation for them, they are forced to encroach upon open land, especially in the shopping zones, resulting in illegal booths, street-side vendors, hawkers and peddlers. It has also resulted in the growth of informal rehri markets in the sector open areas. In a few sectors, the residential area opposite the V4 shopping street has been converted into a commercial area, catering to small businesses. In several sectors, parts of residences are being used as office space, in contradiction to the Capital Development Act, 1952.

4. OPEN SPACES

The extent of open space within sectors in Chandigarh has decreased over time. Whereas, Sector 22 has a wide central green area consisting of a series of wide parks, in both Sectors 44 and 61 it is reduced to a narrow, linear strip. Incidental open spaces have

increased in Sector 44, with several leftover pockets of land lying waste. In Sector 61, some of the incidental open spaces have been earmarked for commercial development, to make full utilization of land. The main reason for the decrease in open space is increased pressure on land due to the substantial increase in population of Chandigarh. Another reason is the lack of funds for maintenance. In several cases, these open areas look unsightly due to dense overgrowth and in some cases they have become a threat to public hygiene, because of their use as garbage dumping sites. Another reason contributing to this is that public open spaces in most sectors lack focal points. Except for the Leisure Valley and the bigger parks, most of the sub-sector greens have no strong activity generators, resulting in under-used spaces. Thus, both the under-use and misuse of open spaces, has discouraged their continued large scale provision in the city.

Even within individual plots, the extent of open space has been reduced in the later phases. Such a change was in accordance with the frame controls that were modified during the second phase of the city to increase the allowable ground coverage from 55 to 60 per cent.

The open spaces in a sector follow a certain hierarchy (Fig.7.38), which has remained the same in all three phases of Chandigarh. It follows from the absolutely public spaces, formed by the roads and open areas outside the house; to the semi-public space, formed by the front courtyard with its low height boundary wall; leading from the interior of the house to the semi-private space, which is the rear courtyard with relatively greater enclosure. Both the front and rear courtyards, though a part of the house, are not completely private spaces because of inadequate spatial enclosure.

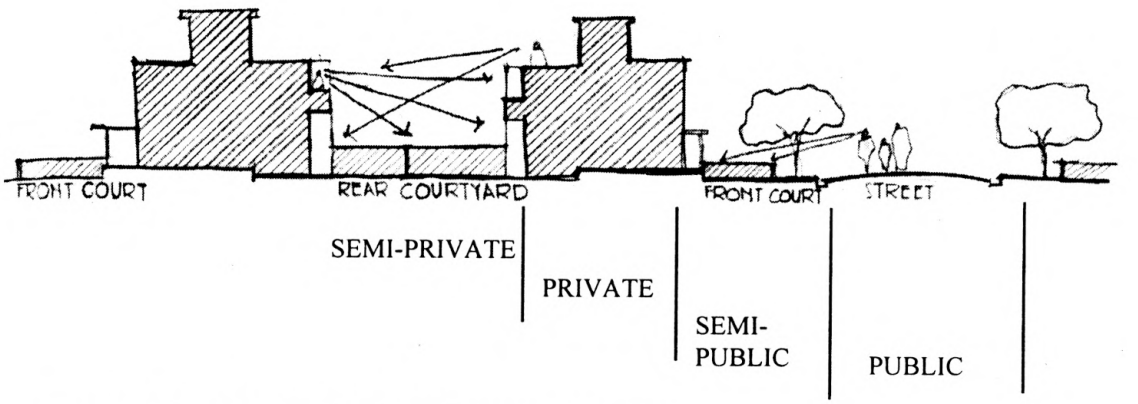


Fig. 7.38 Hierarchy of residential open spaces in the sector.

When Phase I was built, people had problem acclimatizing themselves to such a hierarchy, which was very different from that in traditional Indian houses. Today, such an arrangement, is to some extent, accepted as a part of the culture of Chandigarh, where houses, instead of being inward looking, are based on an open layout. There is still a vast population that refuses to accept such an arrangement, and prefers to use subsidiary methods such as planting trees and shrubs along the boundary walls, to shield the open space from public view.

CONCLUSION

Through the three phases of Chandigarh, the concept of the sector as an inward looking neighborhood unit, with all daily use facilities, has survived. Changes in the various components of the city are inevitable and will continue. Of importance is for the city to not fall below its original standards, which aimed at providing quality life and ensuring adequate space, light, clean air and verdant surroundings to all its inhabitants. Meeting these requirements is becoming increasingly difficult, considering the rapid pace

of population growth and the inability of the city to expand beyond its present boundaries. Phase III, not proposed in the initial master plan, covers the remaining space within the boundaries of Chandigarh. The Periphery Control Act prohibits any growth in a five-mile radius of the city, leaving no more space for the additional growth of the city. Though the satellite towns of Mohali and Panchkula have reduced some of the load on the city, a more vigorous approach towards the regional planning of Chandigarh is required to deal with future growth of the city.

CHAPTER 7.2

COMPARISON OF CHANDIGARH WITH TRADITIONAL INDIAN CITIES

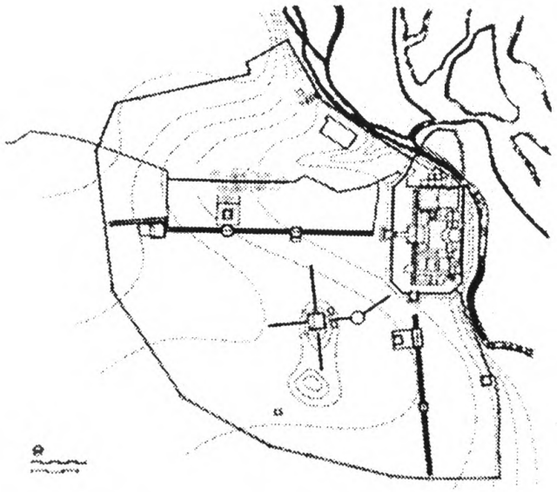
Chandigarh was built at a time of great turmoil in the country. The confusion existing in the political and social milieu was reflected in the architecture of the new nation. The main dilemma facing architectural circles lay in deciding between a traditional or modernist approach. While the traditional approach was a safer and easier recourse, in tune with the Nationalist spirit of the new nation, the modernist approach was equally appealing, being a sign of progress. Chandigarh, the new capital of Punjab and the first independent town-planning venture of independent India, was conceived in the context of these divergent ideas.

The path Chandigarh was to follow was resolved by the single decision of employing the services of Western architects. Thus, even before the city was built, the leaders of the nation and the builders of the new city had decided that the city would follow a modernist path to be shown by a team of Western architects. Chandigarh was, thus, never meant to be a traditional city. Nevertheless, the physical and spatial organization of a city cannot be determined without attention to the social and cultural habits of the majority of its population. Such an understanding can be achieved by learning from traditional architecture, which has continuously evolved and adapted to the needs of the people, the climate, the culture and the site. Traditional architecture, can thus, provide valuable insights for the creation of a better modern architecture, especially for a tradition-bound society such as India.

Chandigarh has often been criticized for being a city diametrically opposed to the structure of a traditional Indian city and insensitive to the lifestyle of the Indian people.

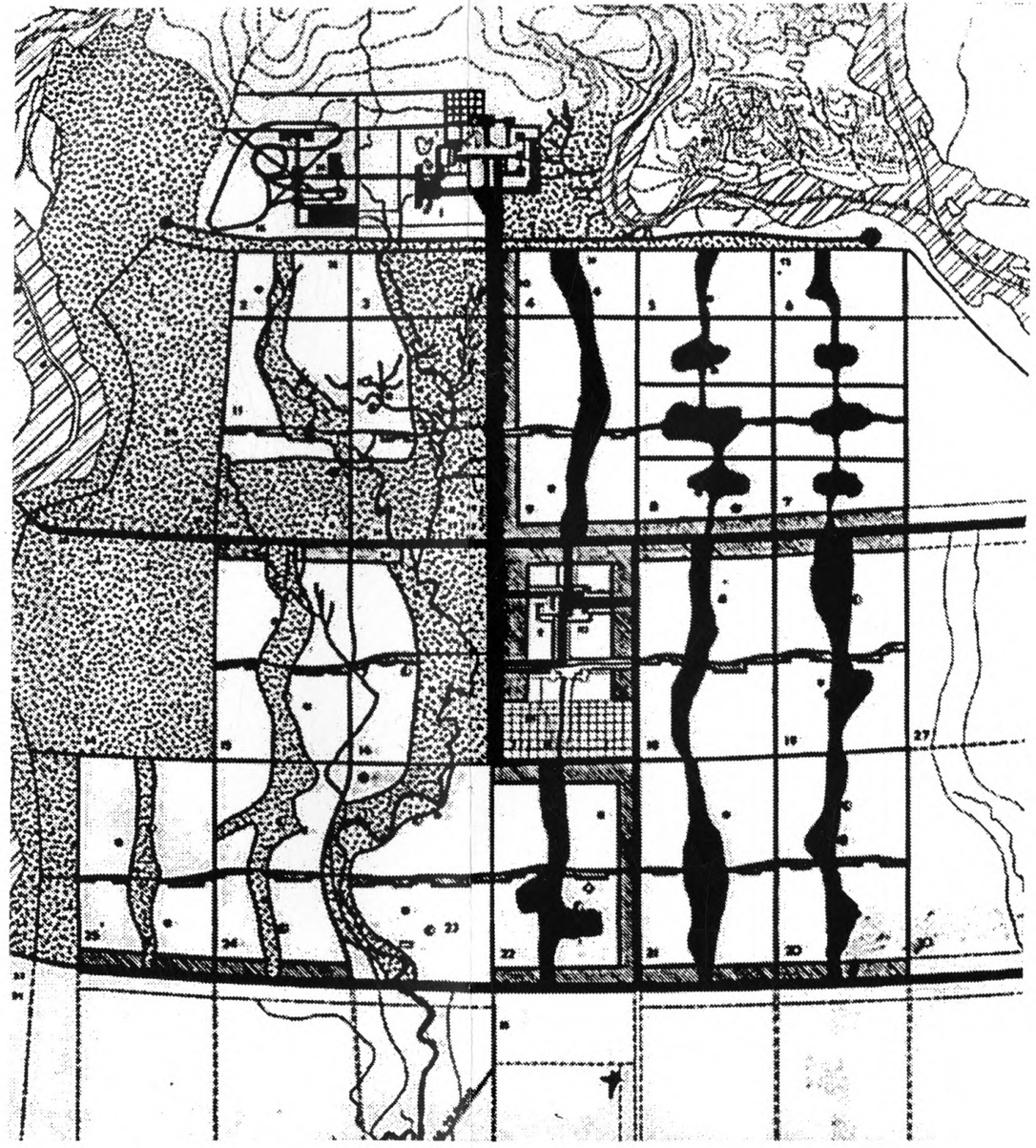
While it may appear so on the surface, a closer examination of the underlying structure of the city and its components, leads one to question such a conclusion. There are several common themes in the organization of Chandigarh and traditional Indian cities, which may not resemble each other visually, but are correlated by purpose. Simultaneously there exist several differences, some of which enhance the living experience in the city and some that have a negative affect. A combination of traditional Indian town planning and modern town planning, as exemplified in Chandigarh, has the potential to generate a basis for improved guidelines for town planning in India. Thus, a comparison of Chandigarh with traditional Indian cities is important to trace their similarities and differences and to speculate on the scope for future improvements.

For the purpose of comparison, two traditional Indian cities are selected and studied in the preceding chapters. The cities selected are Jaipur and Old Delhi, both capital cities that lie in geographic proximity to Chandigarh, share similar climate and like Chandigarh, were specifically designed as administrative cities. Old Delhi and Jaipur, both examples of planned cities in India, present an interesting comparison with Chandigarh. Jaipur is an example of strongly geometric growth, whereas Old Delhi or Shahjahanabad presents an example of more organic growth imposed on an underlying geometric order. The study is carried out first by comparing the overall planning of the cities, followed by a discussion of the various components constituting them, aided by a discussion of the figure/ground plans of blocks from the three cities. The description



OLD DELHI

JAIPUR



CHANDIGARH

0 150 750 M (Scale is same for all three plans)

Plate 7.21 Geometric Framework of the three cities, Old Delhi, Jaipur and Chandigarh.

simultaneously discusses the social, cultural, political and economic factors involved in the design of these cities.

MORPHOSTRUCTURE

1. THE OVERALL PLAN

- **Geometric ordering**

The three cities of Jaipur, Old Delhi and Chandigarh (Plate 7.21) are designed with an underlying geometric order that forms the basis of the built fabric of the three cities. Whereas, this geometric order still persists in Jaipur and Chandigarh, in Old Delhi it has been diluted by organic growth that progressed unchecked. The use of a geometric grid as an element of formal control is not new in India. It dates back to Vedic times, when the mandala (a grid of squares) was used to generate a grid for the layout of the city. The mandalas (Fig. 7.39) as models of the cosmos were abstractions that were applied to both architecture and town planning.[184] An example of this is Jaipur, which is designed on a variation of the nine-square mandala. The plan was not a blind application of an abstract principle, but a rational application of a grid that was adjusted to conform to the particularities of the site. The nine-square gird was rotated at an angle of 15 degrees to accommodate a natural ridge on the site. One of the nine squares had to be

[184] According to Michael Sorkin, "The early Vedic manual of architecture, Vastu Shilpa Shastra, the feng shui of India, with its characteristic synthesis of spirituality and common sense, offers a strategy for harmonizing architecture with the basic forces of the universe by, in effect, creating structures that absorb maximum available benefits from the character and "energies" of the site—concretizations of the abstract. The premise of the text is that the originating art of architecture is the earth itself. Inherent in this theory are beautiful, implicit ideas of stewardship and continuity, which ought still to form a basis for our thinking. Like rationalism, though, this geometricization of spirit, this rendering of one abstract system into another, works because geometry is the substance of architectural description. As with our own styles of rationality, this system is thought to aid human physical, psychical, and moral development"
Sorkin, Michael. (1998). *Chandigarh After Le Corbusier.* In *Architectural Record.* Feb.1998, Pp. 68-73.

displaced because of a hill outcrop and placed in the south-east corner of the city, making the plan of the city asymmetrical (Fig. 7.40). Compared to Jaipur, the plan of Chandigarh is based on a more ordered gird of 800 meters by 1200 meters. This dimension was not based on an abstract principle but was carefully worked out on the basis of travel time between extreme points in the sector. Though the grid is rigid in its application it does, like Jaipur, make allowance for the particular characteristics of the site. The horizontal grid roads are slightly curving to respond to the natural slope of the site and to orient the roads away from the glare of the harsh summer sun. The city is designed to fit between two seasonal riverbeds that run along the east and west edges of the city and uses the slope of the site for natural drainage. Thus, both Jaipur and Chandigarh are built a geometric grid that adjusts itself to the particularities of the site.

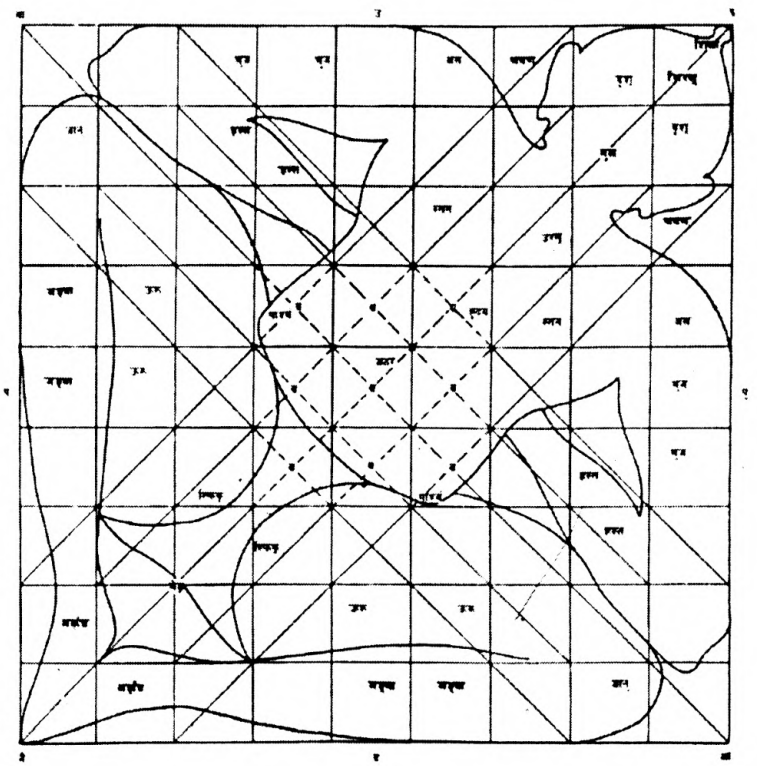


Fig. 7.39 The Vastupurusha mandala, based on a square grid.

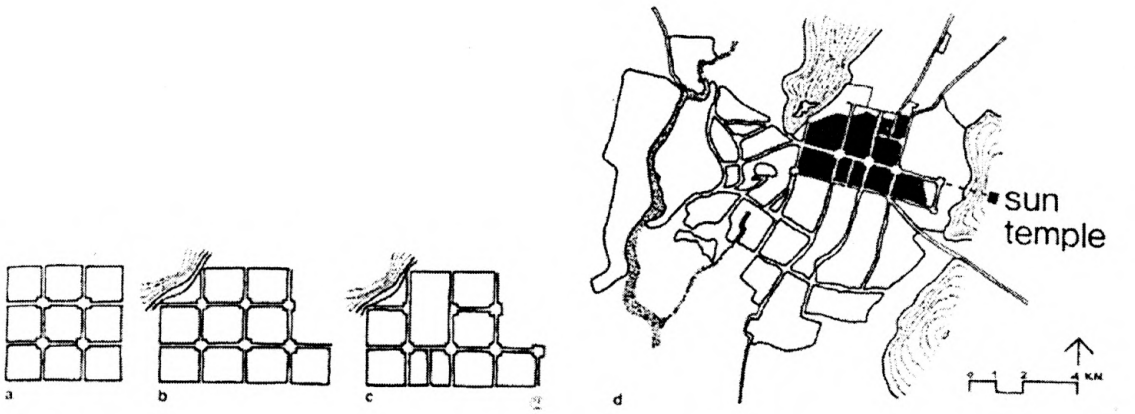


Fig. 7.40 The plan of Jaipur is based on variation of a nine-square mandala.

- **Role as capital cities**

Designed as capital cities, both Jaipur and Shahjahanabad (Old Delhi) were built on a monumental scale reflected in the design of the royal palace, the citadel of administration. In both cities, the palace is placed at the head of the city, in the most prominent position, usually elevated at the top of a hill. Such a symbolic placement of the citadel occurs in Chandigarh as well, where the Capitol Complex forms the symbolic head of the city. Placed at the extreme north of the city, it is set amidst an artificial landscape of hills, with the Shivalik hills forming a majestic backdrop. Another interesting similarity with Jaipur is that in both cities no growth is allowed north of the citadel to maintain the hierarchy.

In both Jaipur and Shahjahanabad, the palace was sited next to a water body, the Raja Mull Lake in Jaipur and the Yamuna River in Old Delhi. Water, considered to be a sacred and purifying element, is always present in some form in traditional Indian cities, as a lake, a river or an artificial pool in the temple. In Chandigarh, the lack of a ceremonial water body was compensated for by the construction of an artificial lake at the north-east end of the city. It is not a coincidence that it is sited next to the Capitol

Complex. Thus, the role of the Capitol Complex as the governing 'palace' of the city completes its analogy to traditional Indian cities.

- **Social hierarchy**

The ordering of Chandigarh was neither an arbitrary decision nor a blind application of that in traditional Indian cities. Though it does bear an underlying resemblance to both Jaipur and Old Delhi. In both these cities, the palace occupied the most exalted position. Next to the palace were the houses of the noblemen, the higher caste people and rich traders, with the poor and lower caste people relegated to areas near the city walls. The social organization of the city was thus related to the distance from the palace. In Chandigarh too, the socio-economic hierarchy follows the distance from the citadel or the Capitol Complex. The sectors closest to it were the high-income, low-density sectors, occupying the most prestigious position in the city. The hierarchy following north to south, was determined by the distribution of different size plots in various sectors. The sectors closer to the Capitol Complex have larger plots (1 to 10 *kanals*), with the size decreasing towards south. A study of the distribution of members of various castes in Chandigarh was undertaken by the sociologist, Victor d'Souza who found no striking pattern of grouping on the basis of caste. Some tendency towards grouping and segregation was observed only in the lower castes. [185] As expected, there is a higher concentration of upper castes in sectors that were higher in socio-economic status. Thus, the influence of the caste structure in determining the layout of Chandigarh is much less than that in traditional Indian cities, making it a more egalitarian city. This is a positive step in the abandonment of traditional caste, religion and linguistic barriers in

modern Indian society. There was a slight tendency to revert to old traditions in the later phases of Chandigarh. It is reflected in the increased tendency of grouping on the basis of occupation in the second and third phase of Chandigarh, thus adding another factor in determining the social organization within the city. Grouping on the basis of trade or occupation is common in both Jaipur and Old Delhi, where it formed one of the bases for social organization in *mohallas*.

- **Functional division of the city**

While Chandigarh is similar to traditional Indian cities in several respects, there are several important differences. The most important difference lies in the spatial structure of Chandigarh. The design of Chandigarh was based on the CIAM Town Planning Grid, which divided the city into four functional zones: living, working, care of the body and spirit and circulation. Such a demarcation of the city into four separate zones is contradictory to the spatial structure of traditional cities where all these functions were conjoined, with no specific demarcation into zones. Both Jaipur and Old Delhi are characterized by multi-use spaces exemplified in the design of the havelis and the streets. The inadequacy of Chandigarh to provide for multi-use spaces has led to several changes in the city. Some of these changes are reflected in the use of residences for small businesses and offices and the use of commercial areas as recreational areas, uses that were not necessarily intended.

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[185] Refer to the study of 'Spatial Structure' by *Victor D'Souza*, pp.99-125.

- **Rigidity in controls and standardization**

In most traditional Indian cities there is allowance and opportunity for organic growth, whereas in Chandigarh there is not much scope for change and all new development is regulated by an array of controls and bye-laws. Present day Delhi and Jaipur present an interesting picture of cities that have a geometric framework, combined with organic growth. In Delhi, the geometric form is not very evident because of additions and alterations that were allowed by relaxed zoning and building bye-laws. But the underlying order still persists, as is seen in the strong axes formed by the main boulevards of the old city. In Jaipur, the growth has been more controlled, with several byelaws and codes determining most changes in the city. The controls in Jaipur allow a margin of flexibility, with details left to the individual land- owner. In Chandigarh, strict byelaws and controls that have remained virtually unchanged through the fifty year history of the city have ensured the preservation of the original framework in its entirety. Rigidity in the nature of development has led to a tedious uniformity. There is a dull and monotonous appearance in most of Chandigarh's controlled development, especially the commercial area. In this respect, the controls have had a negative impact on the development of the city. The city's planners do agree that the controls need to be revised and made more flexible, but are caught in a bureaucratic system where no one wants to take the initiative.

The use of controls and standardization in Chandigarh cannot be dismissed as being totally incongruous with traditional Indian architecture. The use of standardized codes for the design of buildings in India, can be traced back to Vedic times, where the *silpasastras* laid down rigid codes for construction, that could not be violated. This

included all the details of construction ranging from the shape and size of plots, orientation of the house, number of storeys and materials for construction to the smallest of details such as the size of nails to be used. Each of these details was worked out separately for each caste.[186] Compliance with such rigid codes gradually became watered down with several centuries of foreign invasions and influences. One form of control that remained and is seen in Jaipur and Old Delhi, was the use of city walls to prevent the outward growth of the city. An abstract translation of this can be seen in Chandigarh in the form of the Periphery Control Act[187], which prohibits any construction in a ten-mile radius beyond the city. Like the city wall, its purpose is to designates the city limits, regulate development, prevent the outward growth of city and preserve the surrounding rural areas. With no need of a protective enclosure, which a city wall essentially was, it can be regarded as a modern equivalent of a city wall.

- **Road Layout**

The road network (Plate 7.22) in Chandigarh is definitely an improvement over that in Old Delhi and Jaipur, catering better to present day speeds and vehicular traffic. The hierarchy of roads is, however, conceptually the same. First in the hierarchy are the grid roads forming the widest and most important roads of the city (the primary streets or the V2 and V3 roads in Chandigarh). From the grid roads traffic is distributed to the block by a network of secondary roads (the V4 and V5 roads in Chandigarh).

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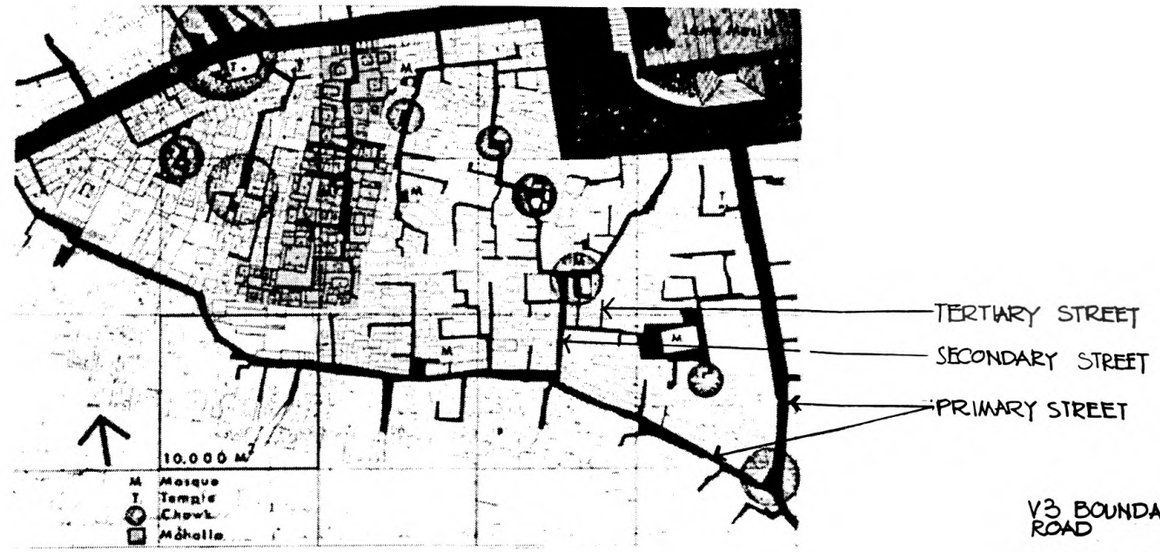
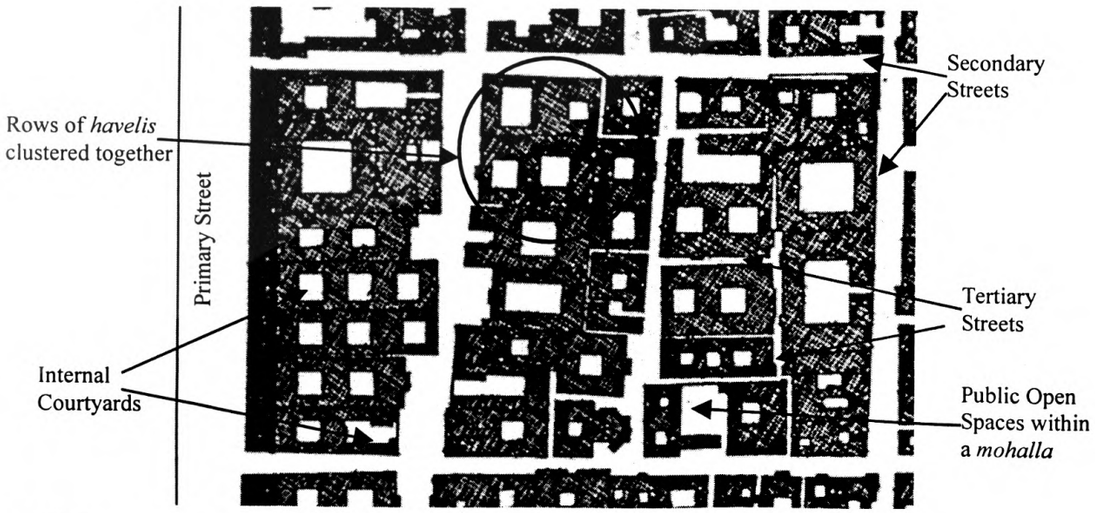
[186] Chandoke, S.K. (1990). *Nature and Structure of Rural Habitations*. New Delhi: Concept Publishing Company.

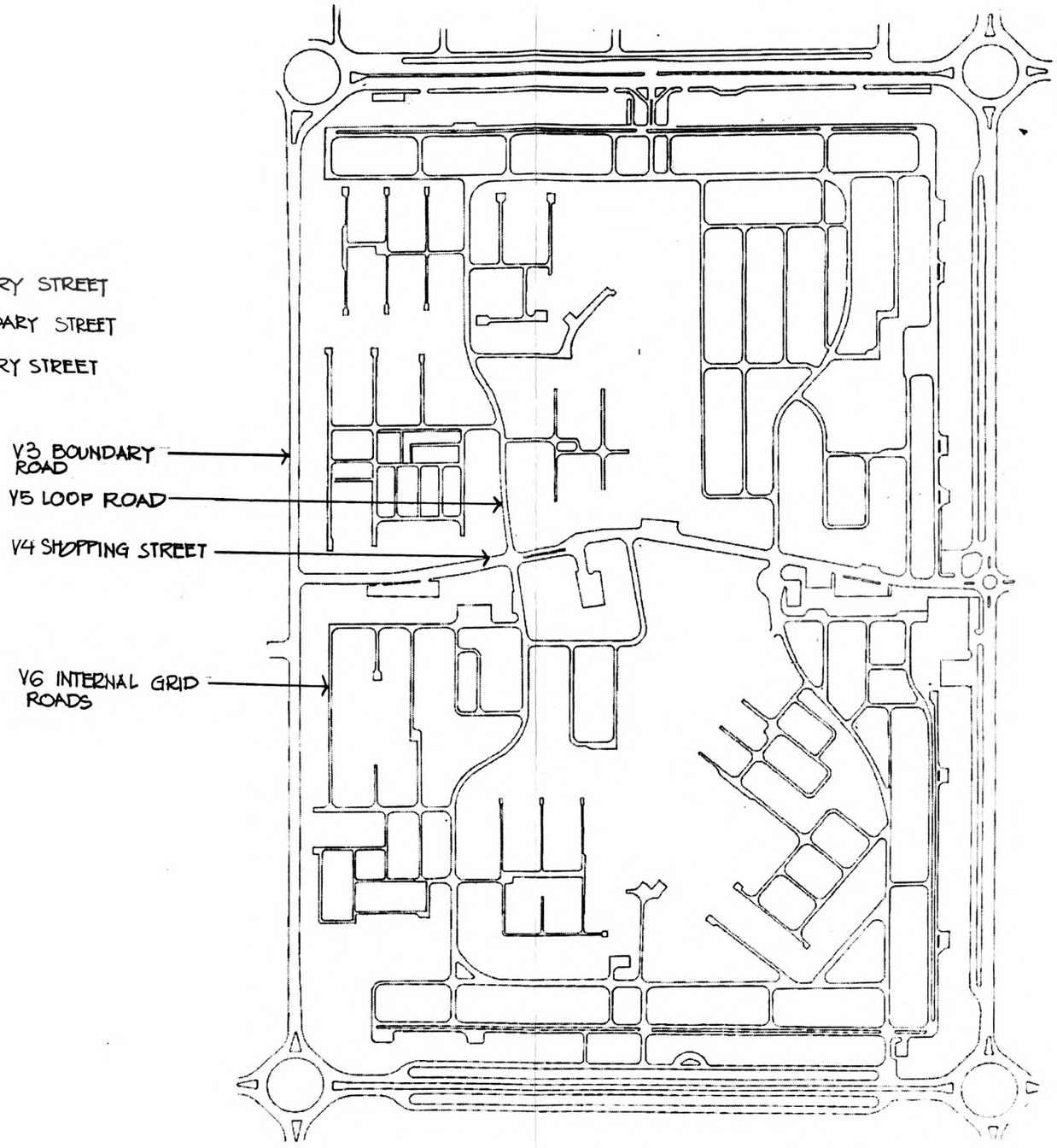
[187] The Periphery Control Act was a law approved by the President of India, regulating growth on the periphery of Chandigarh. The law came into force on January 12, 1953. Its main objective was to control the outward growth of the city and to prevent urban slums from cropping up in the peripheral green belt of the city. Initially the Periphery Control Act applied to a five-mile radius beyond Chandigarh but in 1962 it was extended to regulate growth in a ten-mile radius from the outer edge of the city.



OLD DELHI



JAIPUR



CHANDIGARH

Plate 7.22 Road network in the three cities.

From these, a branching network of tertiary roads (V6 roads in Chandigarh) provide access to individual houses. Thus, the hierarchy of roads is the same in Chandigarh and traditional Indian cities.

The road system in Chandigarh, with its wide avenues, has been proclaimed by some to be more suited to the Western industrialized nations than to Indian settings. That may have been true when Chandigarh was first built, but rapid industrialization since Independence has led to an increase in vehicular traffic within the city, justifying the wide, uninterrupted avenues that exist in Chandigarh. The road network in Chandigarh permits traffic speeds much higher than in other Indian cities. The permissible traffic speed on the main roads of Chandigarh is 65kmph, compared to an average speed of 40kmph in most towns in India. Permissible speed within the sector is 30kmph, which is far above the slow speed of traffic in the narrow streets of most old cities in India. The narrow streets were designed for pedestrian movement and for climate control. The road network in old cities is challenged by the advent of fast moving motor traffic and also hinders fire and emergency vehicle access. The traffic system in Chandigarh is suited much better to present day traffic, resulting in fewer accidents than compared to other towns of the same size. It also caters well to the need of emergency services.

Contrary to the image of traditional cities with a characteristic network of narrow streets and *galis* that are incapable of supporting motor traffic, Jaipur compares with Chandigarh in road widths. The main grid roads in Chandigarh are 100 feet wide, very close to the 108 feet wide grid roads surrounding the *chowkris* in Jaipur.

Both in Old Delhi and Jaipur, the main roads form *bazaars* or linear piazzas with important commercial development along them. They cater to a mix of vehicular and

pedestrian traffic. In Chandigarh the V2 and V3 roads also have commercial development along some of these boundary roads. But unlike traditional cities, these roads are only for fast moving vehicular traffic with no adequate provision for pedestrian movement. Thus, these commercial areas can be properly accessed only by vehicular traffic, restricting their use. Functionally, the road network in Chandigarh works better than that in most traditional cities (Jaipur can be said to be an exception in his case).

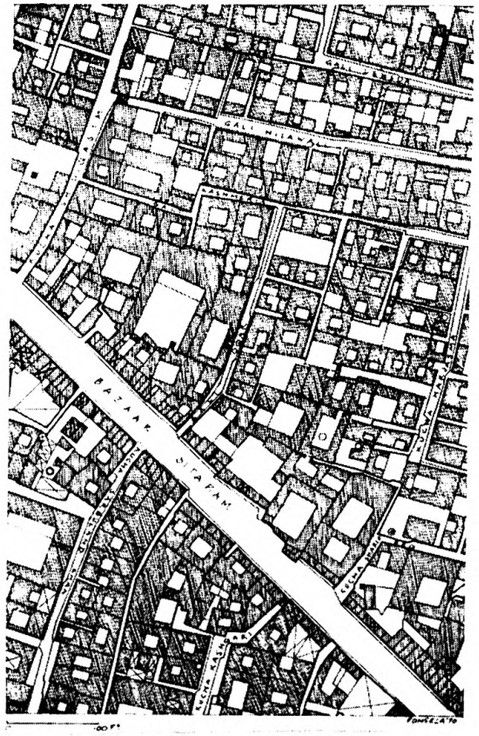
The streets in traditional cities are multi-use spaces, with a mix of residential, commercial and recreational activities. In both Jaipur and Old Delhi, the important roads such as the Tripoli Bazaar and Chandni Chowk have commercial areas on the ground floor and living space on the upper floors. The streets are provided with public squares or *chowks* at regular intervals. These squares form the hub of social activity in the city. They are landscaped, recreational spaces with amenities such as water fountains, food stalls, playing and resting spaces. Such informal leisure spaces add color and vitality to the city. In Chandigarh, there are no such informal spaces on the main avenues of the city. Instead the intersection of the main V2 and V3 avenues are marked by traffic regulating roundabouts. Unlike the *chowks* or *chaupars* of traditional cities, these serve strictly as traffic islands, with no provision for any other activity that would impede the smooth flow of traffic. Moreover, the development along the V2 and V3 roads is controlled by strict architectural controls, resulting in monotonous rows of similar looking buildings in all sectors. Jaipur too has controls regulating development along the main commercial avenues, but these controls specify mainly the building façade line and extent of projection, leaving the intricate details up to individual shop owners. This has resulted in an interesting variety in the façades.

In traditional Indian cities, most of the important roads have landmarks that help the residents orient themselves in the city and also provide a vibrant street life. In Chandigarh there is an absence of landmarks in the city, which along with the uniform appearance of most commercial buildings, make it difficult to orient oneself in the city. Moreover, most of the roads (except for the main V2 avenues) do not have any designated names, making it difficult to identify them, except by associating them with the sector number. In the last few years, some improvement has been made in this respect. Private industries and institutions have taken up the development and maintenance of traffic roundabouts, landscaping them in unique ways, which helps the commuters orient themselves.

The street picture in Chandigarh provides ample scope for improvement. The development along the main roads needs to be on a more intimate scale and allow for a traditional street experience with a mix of commercial and recreational activity. The streets need to be treated as social spaces instead of serving solely as means of circulation. The architectural controls need to be changed to allow for more variety in the façades.

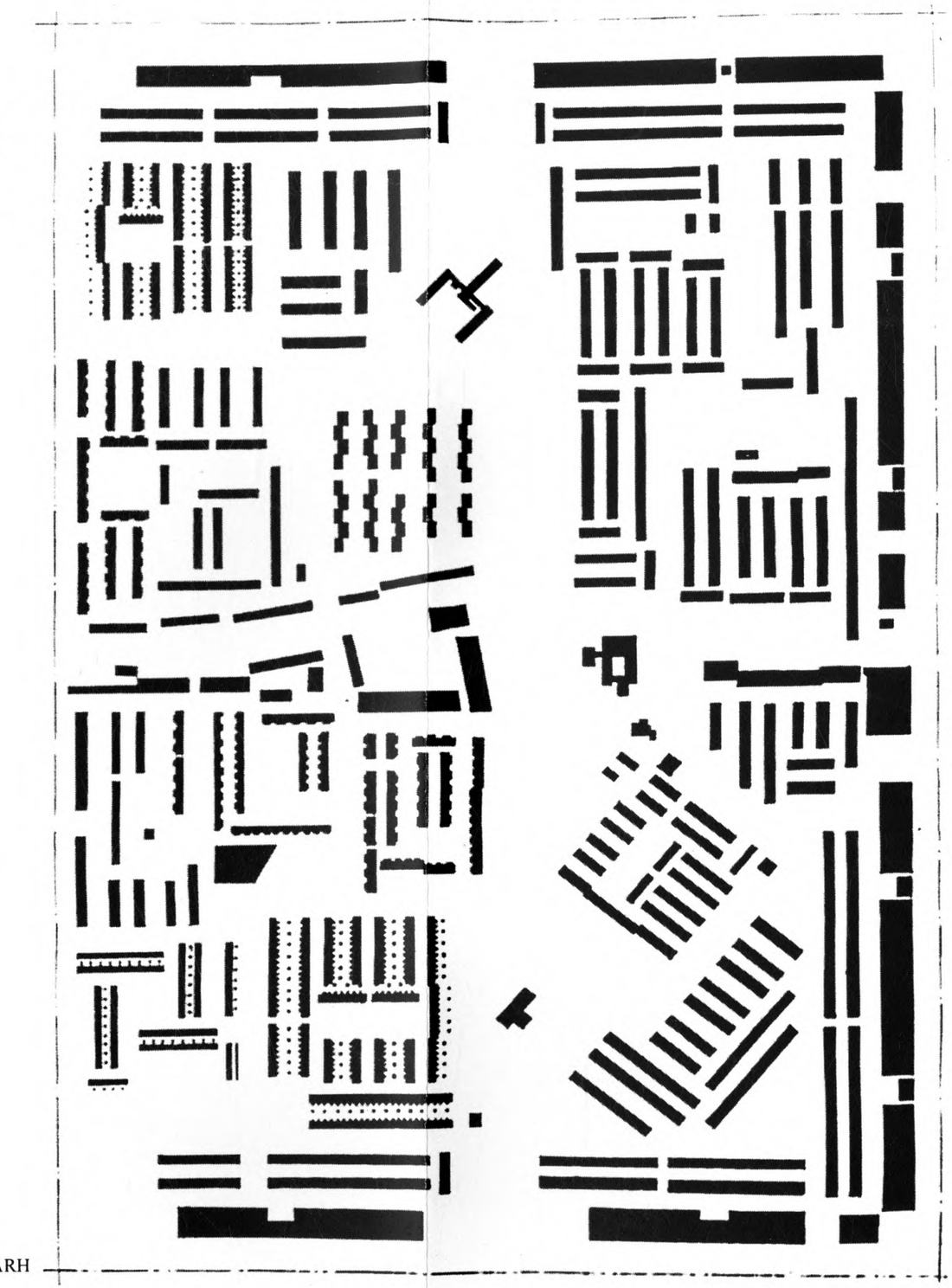
2. THE BLOCK (sector/ chowkri/katra)

In all the three cities, the road network divides the city into smaller units. These are called sectors and sub-sectors in Chandigarh, *chowkris* and *mohallas* in Jaipur and



OLD DELHI 0 40 160 640FT

JAIPUR 0 40 160 640 FT.



CHANDIGARH

0 40 160 640 FT.

Plate 7.23 Figure/ground plans of blocks in the three cities.

katras and *mohallas* in Old Delhi (Plate 7.23). As discussed earlier, both Chandigarh and Jaipur are designed on a cross-axial grid. While in Chandigarh, the grid was rectangular, measuring 800 meters by 1200 meters, in Jaipur it was square with sides measuring approximately 850 meters. Thus, the width of a sector in Chandigarh is very close to that of a block or *chowkri* in Jaipur. The difference between the two cities is in the internal organization of these blocks. In both Jaipur and Old Delhi, the blocks are divided into smaller units called *mohallas*. In Jaipur, the *mohallas* are defined by a smaller grid of roads inside the main grid surrounding the *chowkris*. In Old Delhi, the division of *mohallas* is less definite, with the boundaries of *mohallas* being almost nebulous. The *mohallas* in both the cities are social units bound by a common trait such as trade, occupation, caste, kinship or religion. Each *mohalla* is a self-contained neighborhood unit providing the resident with most daily use facilities.

The sectors in Chandigarh, demarcated by a grid of V2 and V3 roads, are divided by the V4 and V5 roads into quarters called sub-sectors. Unlike *mohallas*, the subsectors are not independent units, but are a part of the neighborhood, sharing common facilities. The main difference in the organization of a sector in Chandigarh and the *mohallas* in traditional Indian cities is the loose organization of the sector. Unlike a *mohalla*, whose residents are bound by a common tie either of caste, kin, religion or occupation, there was no attempt to do this in Chandigarh. The only apparent link was equity in the level of income and government rank (in the case of government housing), prompted by grouping of similar size plots. The residents in Chandigarh are not tied by a common bond, a factor that is responsible for the sociability of traditional *mohallas*. This prevents the sectors from developing into tight knit communities. It has also caused some degree of social

alienation within them, with limited interaction between neighbors. Also the size of a *mohalla* in a traditional city is much smaller than that of a sector, making them more cohesive units. For example, most chowkris in Jaipur are divided into about 40 mohallas, each measuring around 160 meters by 160 meters. The size of a mohalla is thus much smaller than even one sub-sector in Chandigarh, which is around 400 meters by 600 meters, resulting in a more intimate neighborhood.

In traditional Indian cities, the residential areas are a mix of housing and commercial activity. There is no such mixing of activity in the sectors of Chandigarh. The Capital Development Act prohibits the use of residences for commercial purpose. While this has resulted in order in the city, it has also resulted in functional division, where various independent parts function well individually, but are not efficiently correlated. The functional segregation has its advantages as well. The use of residential areas solely for dwelling keeps them away from the noise and pollution of commercial spaces. The residential areas are separated from the traffic generated by commercial activity and thus provide safe play areas for children.

A major difference between *mohallas* and sectors is the amount of social interaction afforded in the two. In the *mohallas* of Delhi and Jaipur, the houses (*havelis*) are closely placed on both sides of narrow streets, with common party walls. Thus, the residents are placed close together leading to increased social interaction. In Chandigarh, the opposite houses are placed far apart to provide for vehicular traffic. Social interaction is more of a problem in larger plots where the building bye-laws necessitate leaving substantial setbacks on all sides. Thus, a lack of proximity to the neighbor hinders social interaction within the sector. Another reason for the lack of interaction is that the

community spaces are not integrated with the housing and are treated as separate entities. Lack of social interaction within the sub-sectors is also caused by the absence of focal points for community gathering such as the *chowks* and *chaupars* in traditional Indian cities. This is less of a problem in smaller housing in Chandigarh, especially group housing, where houses are grouped around public open spaces. Intimacy in scale, is thus one of the factors deciding the degree of social interaction in the city. According to one critic:

> *The flaw is not only a misconception of India but a blind spot in vision that did not include textured, small-scaled urbanism within the larger gesture...The fluidity of space that gathers and keeps Indians in communities does not occur within his highly structured spatial concepts: Corb's sectors constitute an open, universal space that does not coincide with dense, personal, Indian-specific space. Chandigarh, the city, keeps people apart.*[188]

It is erroneous to attribute the lack of social interaction in neighborhoods entirely to the layout of housing in the city. Changing social conditions had an affect. Chandigarh has a large working population, which travels away from home to the work place. This also includes a large population of working women. Most of the time after work is devoted to family activities, leaving little time to interact with neighbors. Contrary to the "24 hour solar day" theory of Le Corbusier, which placed emphasis on reducing commuting distances to and from work, the major work centers in Chandigarh are placed outside the main city area. The Capitol Complex, the Industrial Area and the University are all placed on the periphery of the city, causing workers to travel to the extremities of the city. The changing pace of urban life in cities has resulted in people being less active socially, a phenomenon that exists not only in Chandigarh but in other cities as well.

Because of the low density of population in Chandigarh, the lack of social interaction becomes more visible and as a result the residents of the city have been accused of being unfriendly, haughty and aloof.

- **Housing**

A house, the place of dwelling, needs to conform not only to physiological needs, but also the cultural needs of the people. Housing is important in forming the image of the city. In traditional Indian cities, the *havelis* have a strong cultural role where the house is a multi-activity space, serving both as the dwelling and the work place. The *havelis* with their richly adorned facades, inward-looking courtyard structure, and closely spaced neighboring units reflect the importance of surface decoration, privacy and proximity to neighbors in Indian society. The houses in Chandigarh contradict the traditional pattern in several ways. Instead of being inward-looking courtyard houses, they are outward looking free-standing or row houses. The courtyard houses (Fig. 7.41), which draw light and ventilation from internal courtyards, are more suitable to the climate and culture of India than the free-standing or row houses (Fig. 7.42) in Chandigarh. But today most people seem to be content with the free-standing suburban house. One reason for this is that the need for outdoor living in traditional cities has been replaced by indoor living. The extensive use of mechanical means of ventilation and climate control has led to a reduction in the use of sleeping terraces and verandahs. The most serious drawback of the outward looking houses is the lack of privacy. The front and rear courtyards are essentially semi-private spaces with a visible lack of enclosure, thus exposing them to public view.

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[188] *Giovannini*, p.45.

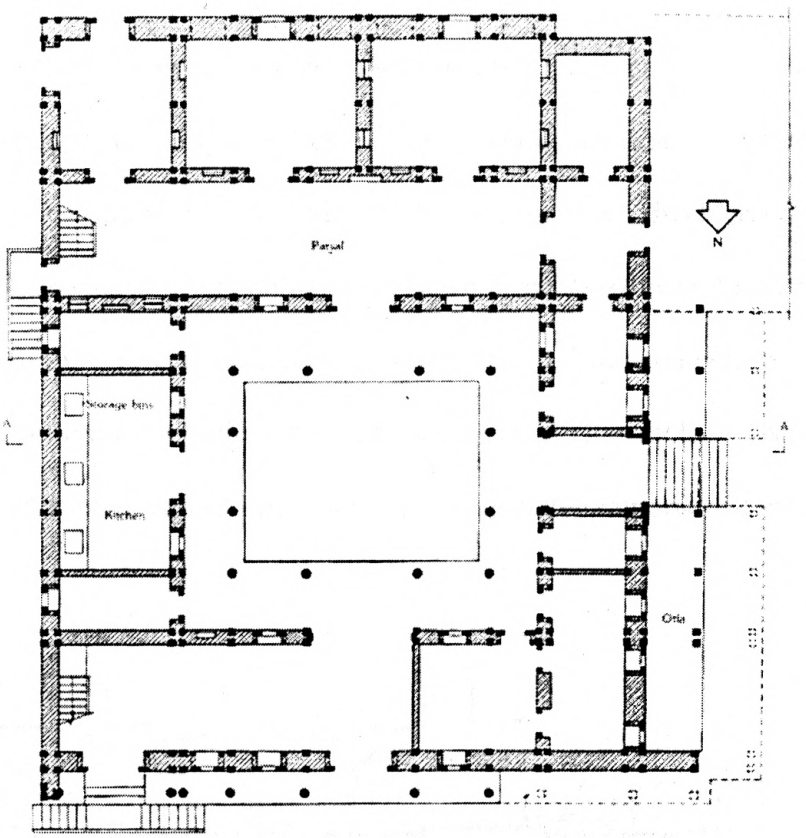

Fig. 7.41 Plan of a traditional *haveli* with a central courtyard.

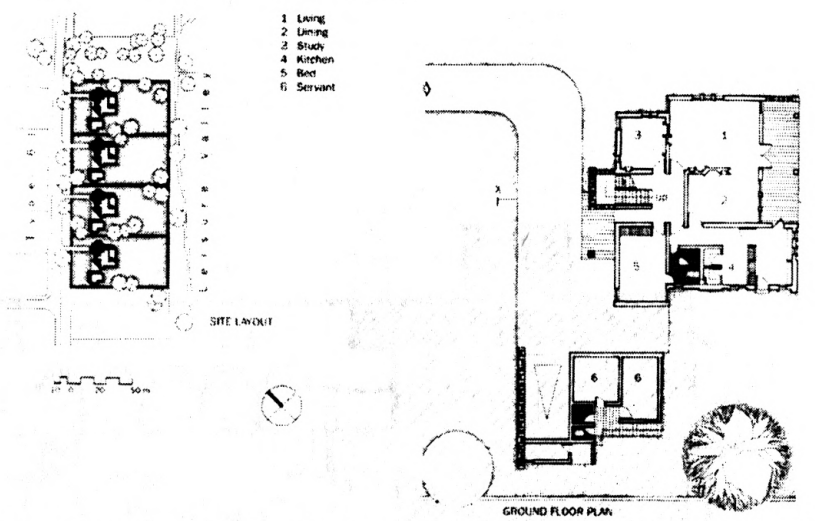

Fig. 7.42 Plan of free-standing houses in Chandigarh, no internal courtyard.

The hierarchy of public to private space in the houses in Chandigarh (Fig. 7.43) follows a sequence from public (the street) to semi-public (the front courtyard with a low boundary wall) to private (the interior of the house) to semi-private space (the relatively better enclosed rear courtyard). In traditional havelis however, this hierarchy (Fig. 7.44) follows a sequence from public (street) to semi-public (threshold) to private space (the interior of the house and the courtyard). The lack of private open space in Chandigarh has led to several improvisations by the house owners. They include, increasing the height of the boundary wall and screening the verandahs with temporary screens.

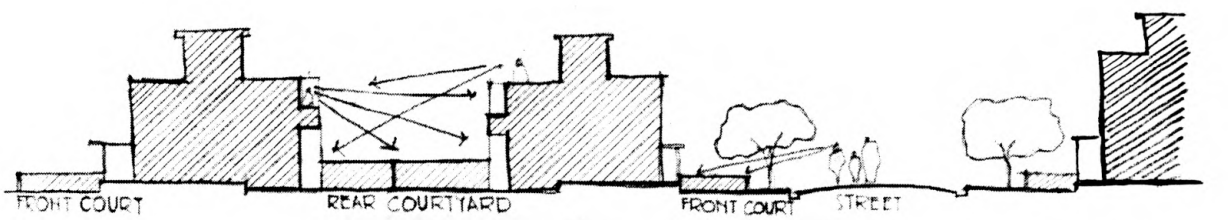

Fig. 7.43 Hierarchy of open spaces in Chandigarh

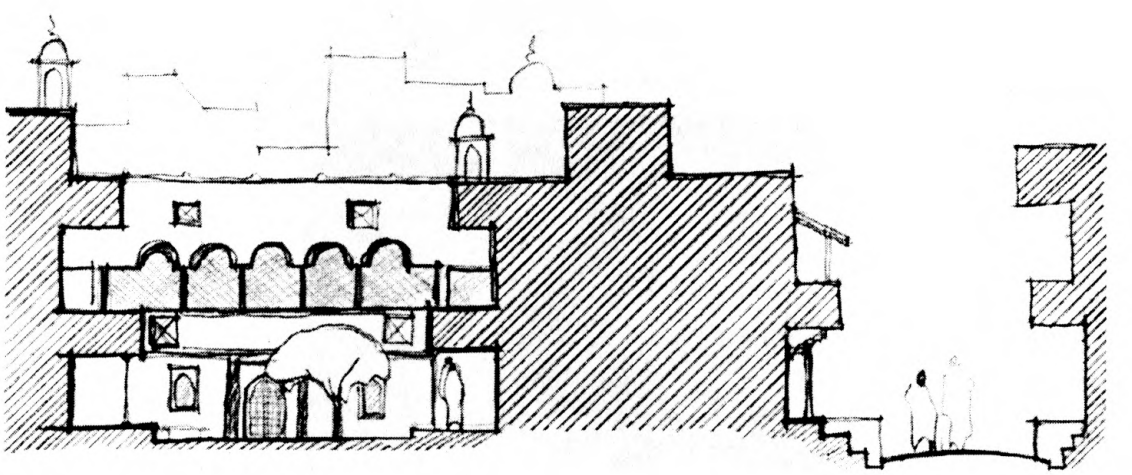

Fig. 7.44 Hierarchy of open space in traditional Indian city.

Visually, the houses in Chandigarh do lack the aesthetic charm and vitality of traditional havelis (Fig. 7.45). The design of houses is more spartan and cosmopolitan (Fig. 7.46), lacking the 'Indianess' of the richly decorated havelis. One of the reasons for this is the influence of the government housing designed by the architectural team of Fry, Drew and Jeanneret on the private housing in the city. Their designs had the underlying order and plain geometric facades of the International Style. This trend soon became popular with the majority of the population and was furthered by the formation of frame controls that support such a style. The frame controls, meant to be regulatory measures have resulted in the lack of individual expression in small houses. Their primary purpose was to prevent haphazard development on the plot, by providing codes for a uniform building line and height. They need to be re-examined urgently to raise the standard of development in the city.

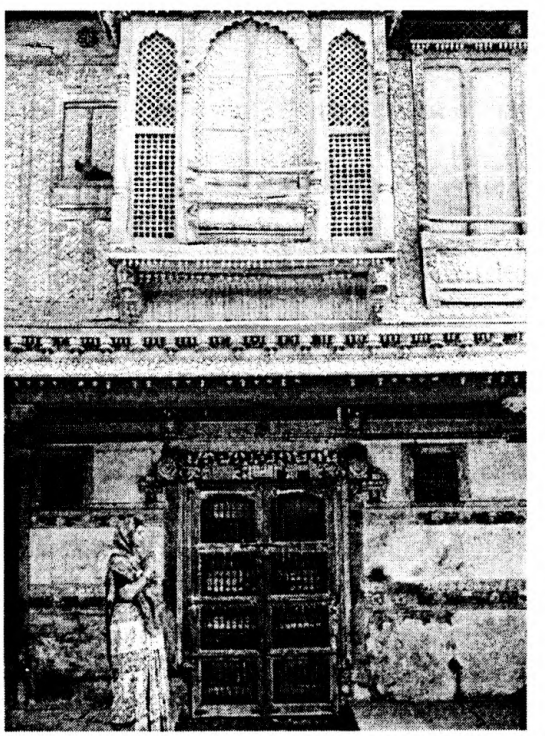

Fig. 7.45 Richly decorated façade of haveli.

Fig. 7.46 The facades of houses in Chandigarh are more plain and spartan.

The *havelis* were primarily designed as multi-famliy units, catering to the needs of the extended family. In India, the extended or joint family has always been prevalent and exists even today. In Chandigarh, houses were designed primarily for nuclear families, instead of extended families. Supporters of traditionalism have often criticized Chandigarh for its inability to support a joint family system. In Chandigarh, households with joint families form a very small percentage, thus making such an argument irrelevant. According to a survey by Victor D'Souza in 1963, only 4.1 per cent of the population of Chandigarh lived in joint families.[189] One reason for this is the large number of government employees that are housed in the city on short-term bases and are provided with accommodation only for the immediate family. Another reason for this is the increasing cost of living in the city, which makes it difficult for the head of the family to support an extended family.

[189] *D'Souza,* p.47.

One of the major shortcomings of the planning of Chandigarh is the lack of provision for the lowest economic category of people in the city, the majority of which constitutes labor involved in the construction of Chandigarh. The lack of provision inside the city, prompted them to occupy land on the fringes of the city, which now form parts of the second and third phase of Chandigarh. Admitting this shortcoming of the master plan of Chandigarh, Maxwell Fry remarked:

> *...that we neglected the lowest-paid people is quite true...When we began to move about we realised that there were vast masses of people who were not included in the project estimate, and we tried to make provision for them, but in a certain sense we failed. There was no economy upon which we could do it, even with the smallest house.*[190]

Since the conception of Chandigarh, the population of homeless in the city has increased steadily. Several rehabilitation schemes have been developed to house these people but a more serious effort is required to solve this problem such as the provision of self-help housing schemes and the provision of low-cost housing using alternate technology such as mud-bricks and fly-ash blocks. Strengthening the economic base of the city would also help improve the conditions of the poor in Chandigarh. Unlike traditional cities, Chandigarh does not support extensive small-scale businesses or informal markets, thus limiting opportunities for the poor of the city. In traditional Indian cities, the urban slums and squatter settlements exist both on the periphery and inside the city. In cities such as Delhi and Mumbai, the cost of urban land and lack of government incentives, have led to a steady increase in the population of the urban poor. The same trend is evident in Chandigarh, where increasing migration from rural areas is causing

[190] Ibid.

such a rise. In general, compared to other cities in India, the facilities for the urban poor in Chandigarh are much better.

- **Commercial Area**

The major commercial areas in both Jaipur and Old Delhi were placed along the main axial roads of the city. These roads, called *bazaars*, were not designed for fast moving traffic. Instead they presented a mix of pedestrian and vehicular traffic. In Jaipur, for example, 25 feet wide pavements were provided for pedestrians on either side of the 108 feet wide main road. In Chandigarh there was no such provision for pedestrian along the main V2 and V3 avenues. In most traditional cities shops are provided on both sides of the street. Contrary to this, in Chandigarh, the shopping streets have development only on one side. In traditional cities, the inner streets were mainly for smaller businesses that were distributed according to trade, resulting in streets specializing in particular businesses. In Chandigarh, there is no such grouping on the basis of trade. There are three kinds of commercial development in the city, the City Center and commercial development along the V2 and V3 roads catering to large businesses, and the V4 shopping streets for daily use facilities. Initially there was no distinct segregation of various trades in the commercial areas, but today they have changed to follow the pattern of traditional cities, with each sector market specializing in a particular trade.

Unlike the traditional city (Fig. 7.47), there is no variety in the visual appearance of the shopping areas in Chandigarh. Most commercial buildings in the City Center and along the V2 and V3 roads are standardized two to four-storeyed buildings in concrete, designed in compliance with the architectural controls (Fig. 7.48). Regardless of their

use, they follow the same design, making it difficult distinguish use or type. While controls are necessary to regulate development, they need to allow for diversity in visual appearance. Unlike most traditional Indian cities, the commercial development along the main roads in Jaipur is regulated by controls (Fig. 7.49) that specify the building line and height. But the controls do allow a certain variety in design provided by the use of a sequence of projections and recesses and by the use of traditional elements such as *jaalis*, *chajjahs* and arches. Unity in façade is provided by specifications such as choice of materials or color, or by rhythmic repetition of façade elements.

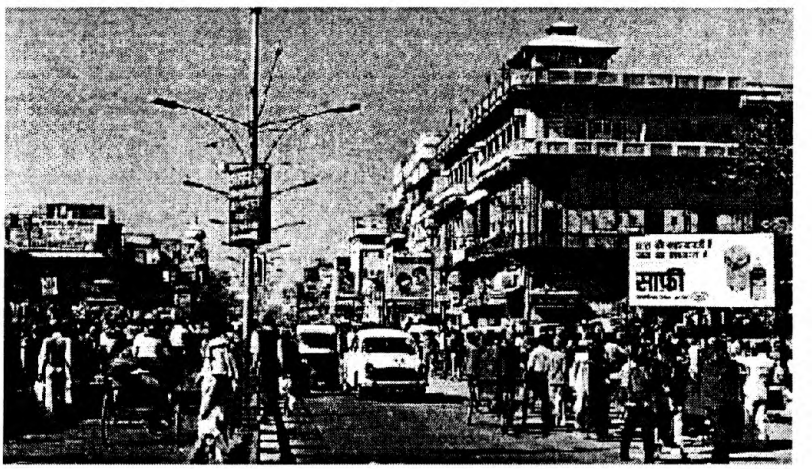

Fig. 7.47 Chandni Chowk, the main commercial street in Old Delhi.

Fig. 7.48 Commercial development along a V2 road in Chandigarh.

Fig. 7.49 Controlled façade of a street in Jaipur.

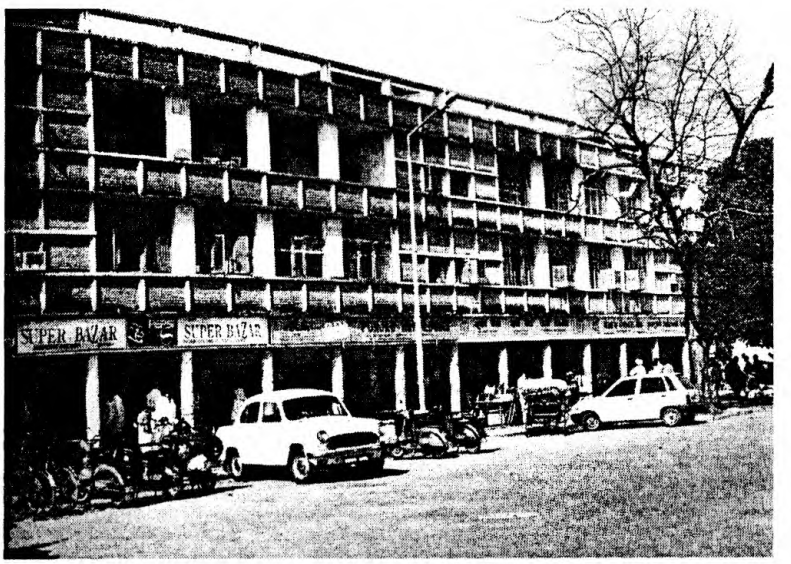

Fig. 7.50 Controlled façade of a V4 shopping street in Chandigarh.

Another shortcoming of the shopping streets in Chandigarh is the lack of spatial enclosure. Most bazaar streets (Fig. 7.51) in both Jaipur and Delhi are narrow shaded streets, with shopping areas on both sides, forming enclosed spaces. The shopping street in Chandigarh (Fig. 7.52) has development only on one side of the street, the south side, to keep all the shops in shade and to prevent pedestrians from crossing the street. The

shopping areas in Chandigarh are designed on a suburban strip mall pattern where residents can drive up to the individual shops. This has resulted in the lack of sociability of the sector shopping streets.

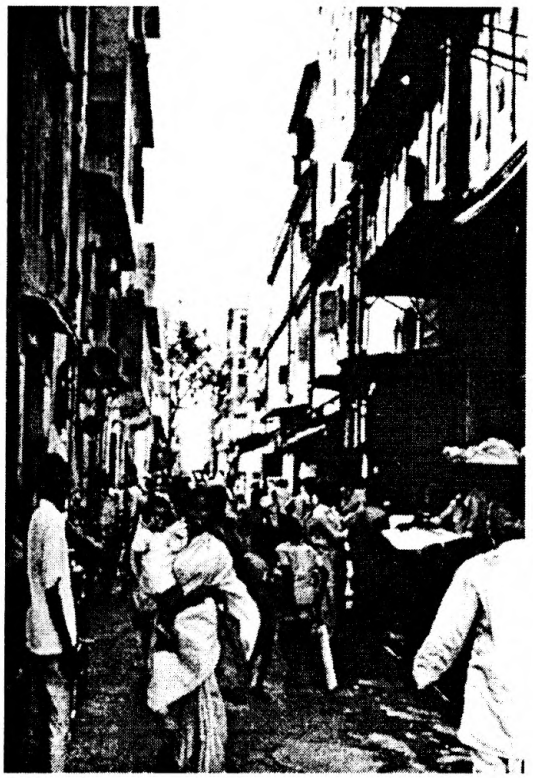

Fig. 7.51 The streets in traditional cities are narrow, shaded, pedestrian streets with a sense of enclosure.

Fig. 7.52 The V4 shopping street in Chandigarh has no sense of enclosure.

The shopping streets also lack the cacophony, the rhythmic interplay of solids and voids, light and shade that are typical in Indian cities. They do not have the provision for social activities and lack activity nodes that were formed by the *chowks* and *chaupars* in traditional cities. The shopping experience in Indian cities, is essentially a social activity, whereas in Chandigarh it is treated solely as a commercial space and disassociated from the recreational functions, which are provided separately.

Space for informal businesses that form an important part of retail commerce for the economically weaker sections of the society (who generally house themselves in the *chowks* and *chaupars*), was not provided for in Chandigarh. This has resulted in unplanned growth of these enterprises, which now occupy space in parking lots and pavements in the shopping street or along the residential streets or in the unused and unattended open spaces within the sectors. Artisans, hawkers and street peddlers also fill up the vast concrete piazza in the city center. Efforts are being made to provide temporary booths for these businesses within some sectors, but effort needs to be made on a larger scale.

Sector markets do have the potential of developing into high activity areas. Some of the steps that can be taken in this direction are, the development of shops on both sides of the V4 shopping street to give a feeling of enclosure, the relaxing of architectural and schematic design controls to reflect some of the color, excitement and vigor of Indian streets and providing for small scale businesses such as food stalls, street vendors, and craftsperson.

In traditional cities, the work place is coupled with residential accommodation, as is evident in the layout of *havelis*. The same idea was used in Chandigarh in the design of

shop-cum-flats, but it did not work well for several reasons. One of them was cramped living space and insufficient storage or workshop space for the shops on the ground floor. Another reason was the increasing cost of commercial land because of high demand, making it more profitable to use the upper floors as commercial space.

- **Open Spaces and landscaping**

A comparison of open spaces can be best achieved by a study of the figure/ground plans of blocks from the three cities (Plate 7.23). From a cursory examination, it is evident that traditional cities have an intricately woven network of open and built spaces. In Chandigarh, the pattern is much looser and the differences occur at a larger scale.

Old Delhi has the most uneven texture of the three cities. The arrangement of the *mohallas* is very informal but there is still a visible hierarchy in its layout. An abstract grid structure exists in the layout of the *mohallas*, where a *mohalla* is organized around a spine street from which smaller streets branch out, much like the veins of a leaf. *Havelis* are closely packed on either side of this branching network of secondary and tertiary streets. The fabric of the city is made up of densely packed *havelis* that are roughly square in plan and share party walls with adjacent units. The urban space is in the form of streets and squares, which have a strong sense of enclosure and form activity nodes in the city.

In Jaipur, the *mohallas* are organized on a more ordered grid formed by 54 feet wide outer roads and 27 feet wide inner roads. Within this grid the *havelis* are arranged in a pattern resembling that of Old Delhi. *Havelis* are packed together on either side of roughly 13 feet wide streets. Most of the *havelis* vary in size and layout and in the extent

of internal open space. There was no fixed ratio of open to built area specified for the *havelis* in most traditional Indian cities, but most of them were designed around one or more open-to-sky courtyards. The roof terrace of the *havelis* added to the private open space within the *haveli*.

In both Jaipur and Old Delhi, the *mohallas*, though defined by an underlying grid, are relatively flexible in their internal layout. Contrary to this, the sectors in Chandigarh have a clearly ordered grid of internal roads along which plots of specific sizes are demarcated and have to be strictly adhered to. The Capital Development Act, prohibits even the joining of adjacent plots to form one larger plot. Thus, the boundaries between houses are inflexible, resulting in a more ordered arrangement within the grid of V6 roads. Unlike the *havelis*, with their uneven building line, the housing in Chandigarh adheres to predetermined building line, beyond which no built part of the house can project. Such an arrangement has resulted in an even texture within the sector.

The form of urban spaces is determined by the layout of the streets and squares in the city. In traditional Indian cities, the urban pattern is formed by an intricate network of intertwined streets and squares. Whereas in Chandigarh, the streets (the means of 'circulation') and the public open spaces (for 'the care of body and spirit') are segregated to serve separate functions. There is a marked absence of public squares that formed the hub of social activities in traditional cities. One reason for their absence and for the separation of streets from public open spaces is the change in the nature of traffic. Le Corbusier's cities of the 'machine age' were designed for speed and based on the provision of uninterrupted traffic flow. Today, the traffic in cities mostly consists of fast moving vehicles, instead of an even mix of pedestrian and vehicular traffic common in

older cities. This has led to a segregation of pedestrian and slow-moving traffic from the high-speed traffic. Thus, urban spaces in the form of public squares in traditional cities are replaced by isolated parks and playgrounds in most sectors.

The main open areas in both Jaipur and Old Delhi are in the form of internal courtyards and *chowks* found at the intersection of major streets. In Old Delhi, for example, twenty-five per cent of the area is devoted to internal courtyards (private open space) and only ten to twelve percent to streets (public open space).[191] This relationship is reversed in Chandigarh, where a major percentage of open areas are devoted to public open spaces. There are no completely private open spaces within the residential units. While such an arrangement was meant to enhance social interaction within the neighborhood, it fails to do so. One reason for this failure is the size of the public spaces, which is too extensive as compared to traditional cities and does not provide an adequate sense of enclosure.

In both Old Delhi and Jaipur, there is a strong interplay of solids and voids. There is a figure/ground ambiguity in both these cities, where the open areas are 'dominant voids shaped by solids'[192]. In Chandigarh, however, the figure/ground relation is not ambiguous, with a loose distribution of solids within voids. While this does give a feeling of openness within the city, it also results in a loose structuring of the individual parts. In Chandigarh, the open areas account for almost half the area of the sector. The predominant open area is in the form of a central green zone that contains parks, playgrounds and several community facilities.

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[191] *Fonseca*, p.111.
[192] A term used by Wayne copper to describe figure/ground relationships. *Copper,* p.46.

In both Jaipur and Old Delhi, there are no significant green areas within the *mohallas*. The only greenery within the *mohallas* is in the form of occasional trees in the *chowks* and *haveli* courtyards. Contrary to this, all sectors in Chandigarh are abundant in greenery, with the central green belt, the grassed incidental open spaces, gardens in the front and rear courtyards of houses and trees planted along all the major roads and streets of the city.

The open spaces in Chandigarh lack a sense of spatial enclosure as is evident in the figure/ground plan of the city. In both Jaipur and Old Delhi, the open spaces are considerably less but possess a strong sense of spatial enclosure. The open spaces in Chandigarh, without significant shading elements, are vulnerable to heat and dust. Norma Evenson calls the open spaces in sub sectors, "dreary dust-filled open spaces, conveniently designated as 'parks' but in reality forming shadeless, overscale barriers between the scattered housing barracks."[193] The openness of the city, with housing units distanced from each other, reduces the opportunity for interaction with neighbors. Older towns relied on physical proximity for neighborliness. According to a study, "none of the migrants to Chandigarh seem to take kindly to the absence of *mohallas* and the close interaction and neighborliness that *mohalla* life presented."[194] The layout of residential units thus presents a contrast to traditional Indian living and is to an extent responsible for lack of interaction between neighbors.

[193] Evenson, *Chandigarh*, p.62.
[194] *Sharma, Sethi, et al.*, p.60.

CONCLUSION

The introduction of Le Corbusier and his team was critical in determining the fate of the city. All the members of the architectural team were pioneers of the Modern Movement in architecture and were active members of CIAM (Congrès Internationaux d'Architecture Moderne). This resulted in the application of the CIAM grid to the plan of Chandigarh. The overpowering personality of Le Corbusier was also critical in the final design of the city. The architectural team was employed with an understanding that they would use the existing master plan for Chandigarh by Albert Mayer. But Le Corbusier, who had pre-determined urban ideas, altered the Mayer plan from its original form. Several critics have admired the work of Mayer and Nowicki over that of Le Corbusier. According to Madhu Sarin, their work was more humane and based on an urban aesthetic that suited the Indian milieu.[195] While with the new architectural team, "Instead of taking direct account of existing day-to-day problem of the people, the emphasis shifted to an application of abstract concepts and principles considered capable of solving all urban problem. Instead of the plan being responsive to the needs of the majority, the majority was expected to adjust to the assumptions contained in the plan."[196] Both Mayer and Nowicki had spent a great amount of time studying the vernacular architecture and building tradition in India. Their designs, in response to that, were more traditional in appearance and bordering on nostalgia for regional imagery. Le Corbusier's ideas were more universal in nature, as is reflected in his design of "A contemporary city for three million", which was not designed for any specific geographic site. On the surface Le Corbusier seems to reject traditional Indian architecture. In a talk with a famous Indian

[195] *Sarin*, p.38.
[196] *Ibid.*, p.36.

writer he exclaims, "What is the significance of Indian style in the world today if you accept machines, trousers and democracy."[197] But an examination of his sketchbooks shows an admiration for several themes he gathered from his travels through India.[198] Jaipur is mentioned only once in his sketchbooks from the various trips he made to India. It seems strange considering the numerous similarities between Chandigarh and Jaipur. This leaves scope for doubt about whether the various similarities between Jaipur and Chandigarh are an uncanny coincidence or the result of a thorough one-time tour of the city by Le Corbusier. Delhi, meanwhile, is mentioned several times in his sketchbooks. Instead of focusing attention on the walled city of Old Delhi, Le Corbusier appears to be marvelled by the grand vistas and ceremonial axis of Edwin Lutyens's Imperial Delhi. The immense scale of the Secretariat buildings, the wide avenues and the landscaped gardens of Imperial Delhi seem to have agreed with Le Corbusier's ideas of urban design. It is commendable that Le Corbusier was able to transform his urban theories, meant for Western, post-war urban centers, to be applied with some degree of rationality and success in a not yet industrialized and predominantly rural, Indian setting. The design of Chandigarh, though traditional in some aspects, does not evoke a sense of nostalgia by a surface imitation of the features and details of traditional Indian cities, as was common in regionalist architecture at that time. Yet, the design cannot be dismissed as being totally modern and in effect non-regionalist. It was a reinterpretation of regionalist culture and ideas, and can be called an example of 'critical regionalism', which denotes a

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[197] Anand, Mulkraj. (1967). *Conversations with Le Corbusier.* In *Le Corbusier: 80th Birthday Anniversary Issue.* Santosh Kumar (Ed.). Bombay: International Cultural Organization. Pp.11-14. Quoted in *Kalia*, p.105.

[198] Le Corbusier mentions briefly his intent to strike a contrast between New Delhi and Chandigarh. Delhi was seen as having unity and discipline, whereas Chandigarh, according to Le Corbusier, is intended to be a rejection of discipline. "Discipline= construction sun wind seasons= responses to all that."
Le Corbusier in his sketchbook (No. K42), dated April 11, 1956, Chandigarh.

combination of the traditional with the universal. Critical regionalism, as an idea, relies on the paradox between, "how to become modern and to return to sources; how to revive an old, dormant civilization and take part in the universal civilization."[199] In the design of Chandigarh, there was an attempt to combine regional Indian architecture with the universal aspirations of Le Corbusier and the design team. The aim of Chandigarh can be summed up in the description of critical regionalism by Kenneth Frampton:

> *It self-consciously seeks to deconstruct universal modernism in terms of values and images which are locally cultivated, while at the same time adulterating these autochthonous elements with paradigms drawn from alien sources.*[200]

In India the process of transformation of the traditional cities to respond to changing times, did not receive much impetus in the pre-Independence era. Under Colonial rule, the main impetus was on new development, mainly in the form of Civil Lines or cantonments. It was only the metropolis cities of Delhi, Calcutta and Bombay that underwent major changes under Colonial rule. Thus, instead of an evolutionary process, the change from traditional to modern was a sudden jump in the post-Independence era. Chandigarh was the result of one such jump, resulting in what is today called the 'Chandigarh Style'. As discussed earlier, India has always been subject to absorbing and transporting into its culture elements from foreign cultures. Similarly, the 'Chandigarh Style' has been accepted and made a part of the Indian tradition. According to Norma Evenson, "A cosmopolitan architecture continues to characterize major Indian

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Le Cobusier. (1981). *Le Corbusier Sketchbooks.* Vol.3 (1954-57). Cambridge: MIT Press. Fig.620.
[199] Ricoer, Paul. Quoted in: Frampton, Kenneth. (1983). *Prospects for a Critical Regionalism.* In *Perspecta 20, The Yale Architectural Journal.* Cambridge: The MIT Press. P.148.
[200] *Ibid.*, p.149.

cities, reflecting a way of life that has become in many ways international."[201] Chandigarh truly, is in many ways cosmopolitan.

Since its conception, Chandigarh has served the role of inspiration and a learning experience for urban designers in India. One of the remarkable feats in the design of Chandigarh is the overcoming of the limitations of finances, materials, skilled labor and technology, and the over-powering bureaucracy that was a legacy of Colonial rule in India. It is far superior to most Indian towns in providing infrastructure, amenities, a clean and hygienic environment and living quarters. Population density in Chandigarh is much less than in comparable towns in Punjab and Haryana, the two neighboring states resulting in less crowded living conditions. The literacy ratio in the city is very high, 78 per cent according to the 1991 census report. The percentage of the upper income population in Chandigarh is much higher than that of its neighboring states. It is 37.5 per cent for Chandigarh as compared to 7 per cent for Punjab and 9 per cent for Haryana.[202] The quality of life is thus, relatively better than in most cities in the neighboring areas. The city can be summed up in a statement made by Pandit Jawahar Lal Nehru, and reiterated by the current President of India,

> *I have welcomed very greatly one experiment in India, Chandigarh. Many people argue about it, some like it and some dislike it...It hits you on the head, and makes you think. You may squirm at the impact but it has made you think and imbibe new ideas, and the one thing which India requires in many fields is being hit on the head so that it may think...*[203]

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[201] Evenson, Norma. (1989). *The Hybrid Metropolis: Western Influences in India.* In *Dwelling, Settlements and Tradition.* Jean-Paul Bourdier & Nezar Alsayyad (Eds.). Lanham: University Press of America. P.425.

[202] Sharma, Kavita, Sethi, Chitleen K., Meeta & Rajivlochan. (1999). *Chandigarh Lifescape: Brief Social History of a Planned City.* Chandigarh: Chandigarh Administration. P.60.

[203] Pandit Jawharlal Nehru, quoted by R.K. Narayanan, the President of India in his speech on the Inaugural session of 'Celebrating Chandigarh' conference, 9 January 1999. [World Wide Web Page]. Source: http://www.cperspectives.org/events/others/pres_speech.htm. April, 1999.

CHAPTER 8

CONCLUSIONS

In the architecture of post-Independence India, there have been two dominant trends. First is that of inspiration from traditional and regional architecture and the other follows the Modernist doctrine. According to Bhatt and Scriver, "Contemporary Indian architecture has no formal roots in its own context. The compulsion to transform the alien modern idiom in the search for an Indian identity has been an impetus to the steady evolution of architectural design since the British era. However, the underlying principles of modern architecture have not been abandoned."[204] In both the traditional and modernist approaches, there is a danger of resorting to a pastiche of borrowed elements. In the contemporary architecture of India, there is an increased desire to find a 'middle-path', to create a contemporary architecture that learns from the traditional heritage of the country and combines it with a universal doctrine while relying on the use of modern materials and construction techniques. This quest for a contemporary architecture, in some instances, leans towards a critical regionalist approach.[205] Critical regionalism, "strives for and upholds the individual and local architectural features against the more universal and abstract ones, and so aims at an architecture with an identity of its own."[206] It relies on the present while learning from the past to seek a 'sense of place' and 'identity'. In the era of global culture, a purely regionalist approach stands challenged.

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[204] *Bhatt &Srciver*, p.11.

[205] Tzonis & Lefaivre desribe critical regionalism as being self-reflective. According to them it relies on the use of the mehtod of "defamiliarization" and citical regionalist buildings provide, "contrasting images to the anomic, atpoic, misanthropic ways of a large number of current mainstream projects constructed world wide, they raise questions in the mind of the viewer about the legitimacy of the very regionalist tradition to which they belong."
Tzonis, Alexander & Liane Lefaivre. (1990). *Why Critical Regionalism Today?* In *Architecture+Urbanism*, May, 1990, No.236, pp.23-33.

In the past few years, such an approach has gained impetus in India, with increasing globalization and changes in the social, cultural, economic and technological conditions. The critical regionalist approach is reflected in the architecture and writings of several leading architects of the country including Raj Rewal, Charles Correa, B.V. Doshi and Ranjit Sabiki. For them, as for most planners in India, Chandigarh serves as a reference point providing the means to measure the degree to which modern principles of town planning can be applied in a traditional Indian context.

There is much to learn from Chandigarh, both from its planning precepts and from how the city has changed over time. The most valuable lesson to be learnt from Chandigarh, however is that while culture and built form are interdependent, allowance has to be made for change over time. From a comparison of Chandigarh with traditional Indian cities, it is clear that they share many of the underlying principles in their design and structuring. The difference lies in the reinterpretation of these elements in Chandigarh. Chandigarh thus presents an application of modernist and regional elements. Such an approach depends, to a great extent on the correct interpretation of the 'context', as defined by the existing political, social, cultural, economic and technological conditions and scope for 'continuity and change' in the city.

Chandigarh was built at a time of great social change in India. The country had just attained freedom after several centuries of foreign rule, there were million of refugees that had been uprooted from their homes, there was communal strife and a new political structure to follow. Amidst all this was the need for the new nation to embark on

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[206] Bognor, Botond. (1990). *On the critical aspects of regionalism.* In *Architecture+Urbanism*, March 1990, No.234, p.15.

a path of progress. The initial construction of Chandigarh was caught in the throes of such social and political changes.

The Chandigarh project was, from the beginning, beset by problems, controversies and constraints. The first controversy was the selection of a foreign architectural team and the second was the selection of a site for the new capital city. Having resolved these, work on the first master plan of Chandigarh proceeded under the guidance of Albert Mayer, assisted by Matthew Nowicki. Nowicki's untimely death in a plane crash led to the selection of a new design team headed by Le Corbusier. This resulted in the development of a new plan for Chandigarh, designed by Le Corbusier. While Mayer's master plan was based on the division of the city into districts, each having three super-blocks measuring 3000 X 1500 feet and covering an area of 100 acres, Le Corbusier's master plan divided the city into blocks called sectors, each measuring around 2600 X 4000 feet and covering an area of 240 acres. Thus, Le Corbsuier's sector was almost twice as large as Mayer's, forming larger neighborhood units. It is this immense size of the sector that is to a great extent responsible for the inability of the sector to work effectivelyas a neighborhood unit. Compared to a traditional Indian city like Delhi or Jaipur, the size of a sector is much too large for the residents to develop a feeling of kinship. Such an overscaling of the neighborhood also results in its inadequacy to cater to the needs of the pedestrian. The scale of the sector and its road network were more suited to the motor vehicle, which is acceptable today because of the increase in vehicular traffic in the city. Compared to traditional cities, the road network of Chandigarh functions more efficiently, with less confusion and chaos in traffic.

The master plan by Le Corbusier was affected greatly by his modern rationalist and, to some extent, Utopian socialist ideas that affected his architectural and urban design theories. The design of Chandigarh finds several antecedents in Le Corbusier's earlier urban designs, particularly the Contemporary City and the Radiant City. Chandigarh is based on a strong geometric grid defined by the circulation system that consists of seven categories of roads. Within this larger ordering of roads there is a smaller framework of residential units constituting the fabric of the city. Compared to a traditional Indian city, this framework is far more rigid, not allowing much scope for change. In traditional Indian cities, there is generally an underlying geometry in plan, but within the basic framework of primary, secondary and tertiary street, there is freedom for individual expression. In Chandigarh, there is not much flexibility in the urban structure of the city. Most of the development in the city is prescribed and controlled by various controls and building bye-laws.

Another difference from the traditional city is the compartmentalization of Chandigarh into distinct functional zones, based on the modernist notion of the isolation of functions in the post-industrial city. Traditional Indian cities do not have a distinct segregation of functions and most areas are marked by mixed land-use, permitting a variety of activities. In spite of all the regulations, there are many violations of the controls and bye-laws in Chandigarh. Most of them involve the covering of open space on the plot to generate extra rooms and the use of residential areas for commercial use.

An important factor in the design of Chandigarh is the social structure of the city. Unlike a traditional Indian city, there is no distinct social organization in the sectors on the basis of caste, religion or language. The predominant basis of organization is the

income level of the residents, determined by the size of plots within the city.[207] In the second and third phase of the city, there was an increased tendency for social grouping on the basis of occupation, one of the factors that was important in the organization of traditional *mohallas*. In general, Chandigarh has been responsive to a move from a caste-based feudal society to a more egalitarian and democratic society in India.

The design of Chandigarh was also based on the garden city model, where town and the country were brought together. Of primary concern to Le Corbusier were the "essential joys"—air, light and greenery. These elements are reflected in the provision of extensive open areas, landscaped gardens and parks in the city. This has resulted in what many see as the high quality of life that Chandigarh offers. The abundant open areas, the clean and green environment, the provision of planned water-supply and sewerage disposal facilities and an efficient traffic management system has made the city one of the cleanest and greenest cities in India.

Apart from the master plan, Le Corbusier was chosen to work on the design of the Capitol Complex. The details of the master plan were left to the rest of the design team, constituting Maxwell Fry, Jane Drew and Pierre Jeanneret, assisted by a team of Indian architects. The work of the design team was hindered by several problems. The most pressing was the economic constraints imposed by a strict budget establlished by

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[207] The social ordering of Chandigarh was a combination of both the Contemporary and Radiant Cities. In the Contemporary City there was a distinct structuring of the city, where the elite occupied residential blocks next to the city center and the workers were relegated to outlying garden suburbs. In the Radiant City, there was a more egalitarian layout and the structure of the city and its housing was no longer based on social class but on family size and needs. Both the luxury housing for the elite and the garden suburbs were abandoned in favor of high-rise mss produced residential blocks called 'unites'. In Chandigarh the class structure of the Contemporary City exists in some measure, though the city is more egalitarian than most Indian cities. The high rise apartment blocks of the Radiant City could not be built in Chandigarh due to cost and technology constraints but the overall concept of the housing being an integral part of the city was maintained and garden suburbs were eliminated.

the government of Punjab. Economy in design dictated much of the development in Chandigarh, especially the design of the thirteen house types. The financial limitation felt by the architectural team was reflected in Le Corbusier's statement, "India has the treasures of a proud culture; but her coffers are empty."[208] The second problem facing the architectural team was repeated interference from the PWD (Public Works Department), a body of engineers that oversees all forms of public construction in the city. Laxity in implementing decisions and a bureaucratic system hindered the progress of work. Despite, these problems, work was carried on through the sheer persistence of the design team and frequent intervention by the Prime Minister of India, Pandit Jawahar Lal Nehru.

Most of the effort of the design team was spent in designing the thirteen (later fourteen) categories of government housing and establishing the various controls for private development. The main factors involved in the design of housing in the city were- climate, economy, building technology and social pattern. While, the government housing in the first phase of Chandigarh received the undivided attention of the design team, the private housing was left to the private sector under the constraints of the frame controls. The frame controls, amongst other things, specified the construction of a mandatory frame on the front façade of all houses with plot size less than 250 sq. yards. No projections were allowed beyond this façade. The building zone was demarcated for each plot size to ensure a uniform building line. The sectional floor heights were also specified in the control sheets to achieve a uniform building height. The controls, though meant to provide unity and harmony in the city, have resulted in a tedious monotony. The solution to this does not lie in total abandonment of the controls, a view that is shared by

[208] Le Corbusier. (1958). *Oeuvre Complete 1952-57.* Zurich: Girsberger. P. 51.

the law-makers of the city. According to Jagdish Sagar, the Advisor to Chandigarh Administration:

> *There is a very strong feeling within the Administration and it is not an unreasonable one- that once you start loosening up there's no stopping, you'll simply be letting go. There will be pressures to relax one control after another once you've made it known that you're amenable to any pressure to relax anything at all: and it will really become more difficult to enforce controls that are changing, they will be violated more easily.*[209]

The controls and the bye-laws for Chandigarh have remained unchanged since the conception of the city and there is an urgent need to reexamine them according to changing needs and in the present social, cultural, economic and technological context.

The first phase of housing in Chandigarh was dominated by the variety and character of the various categories of government housing in the city. The private housing followed the trend of the government housing. The second and third phase of Chandigarh have seen a relative improvement in the quality of private housing in the city, accompanied by a drop in the standard of government housing. The main reason for such a change is the rise in the standard of living in the city and improved awareness of architectural aesthetics in the increasingly literate and predominantly working-class population of Chandigarh. The various categories of Government housing in the later phases of Chandigarh were reduced from fourteen to only five broad categories, which were again based on the income level of the residents. The urgency to provide for the increasing population of the city superceded quality construction and imaginitive design solutions. The housing became more standardized and coupled with a reduction in the

[209] Sagar, Jagdish. (1999). Speech by Jagdish Sagar, Advisor to the Administrator. [World Wide Web Page]. Available: http://www.cperspectives.org/events/others/advi_speech.htm. 20 January 1999.

number of categories, has resulted in a more uniform appearance. The increase in the population of the city has also resulted in the construction of four-storeyed apartment type housing. The second and the third phases of Chandigarh, were thus, designed as high-density sectors, with mostly small sized plots and multi-storeyed housing.

In spite of all efforts, the city is experiencing a housing shortage[210], resulting in a squatter population of the city living in unauthorized settlements. In 1971, 15 per cent of the population of Chandigarh lived in unauthorized settlements and by 1997 this had increased to 20 per cent, almost on a par with the rest of the country. The poor economic base of the city has contributed significantly to the growth of unauthorized squatter colonies in Chandigarh. With the absence of a strong economic base at the local level, the city had to rely on help from the central government and outside agencies, making the task more difficult. The situation was worsened by continuous political changes in the status of Chandigarh. In the second phase of Chandigarh, there was more focus on the provision of housing for the economically weaker sections of the population. Several rehabilitation colonies were designed to resettle the urban poor but the authorities have not able to keep pace with the rapidly growing squatter population of the city.[211] According to Jagdish Sagar, "It is impossible to make any urban housing in India cheap enough to prevent people from living as squatters as long as, at their standard of living,

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[210] The estimated housing shortage for 1997 was 28,465 dwelling units. Considering a projected population of 852, 364 for 2001, there will be an additional requirement of approximately 24,752 dwelling units, making the total required dwelling units to be 53,217. Of these 20,398 dwelling units will be provided in the third phase and another 4840 in Manimajra (a subuurb made in contrivance of the original master plan). Considering the unavailability of land beyond these recent developments there will still be a housing shortage in the future.
Source: Chandigarh Administration. (1998). *Development of Chandigarh in Regional Context.* Chandigarh: Chandigarh Administration. (unpublished report). P.3.

[211] Since the early 1970's approximately 20,000 jhuggi dwellers have been resettled in alternate accommodation.
Source: *Chandigarh Administration*, p.2.

they are willing to do so. It is even argued cynically that the effort to do so would only attract people into the cities in search of valuable real estate."[212] While such an assumption may be true, it cannot be treated as a basis for deciding the fate of the urban poor.

One way to improve the conditions of the urban poor is to provide increased work opportunities by the provision of opportunities for small-scale enterprises. This will help strengthen the economic base of the low income population of the city. Another step in this direction can be the strengthening of the industrial base of the city, considering that industry will generate more jobs and bring increased revenue to the state. Though Le Corbusier and the Indian government had originally stated that Chandigarh was to have only minimal industry, the government soon realized the need for increased industrial development in order to have a healthy economic base. Since the early 1960s the government has been taking increased steps to attract specialized industry to the city.

One of the effects of the growth of the population of Chandigarh has been the development of several satellite towns along the periphery of Chandigarh (Fig. 7.53). Most of them have resulted in unauthorized development along the periphery of Chandigarh, in contttradiction of the Periphery Control Act, which prohibited any development in a five-mile radius around the city. Some of these satellite towns are Punchkula, Parwanoo, Sahibzada Ajit Singh (S.A.S.) Nagar or Mohali, Hindustan Machine Tools (H.M.T.) Township and Chandimandir Cantonment. The lack of facilities in the satellite towns has put a strain on the infrastructure and resources of Chandigarh.

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[212] *Sagar.*

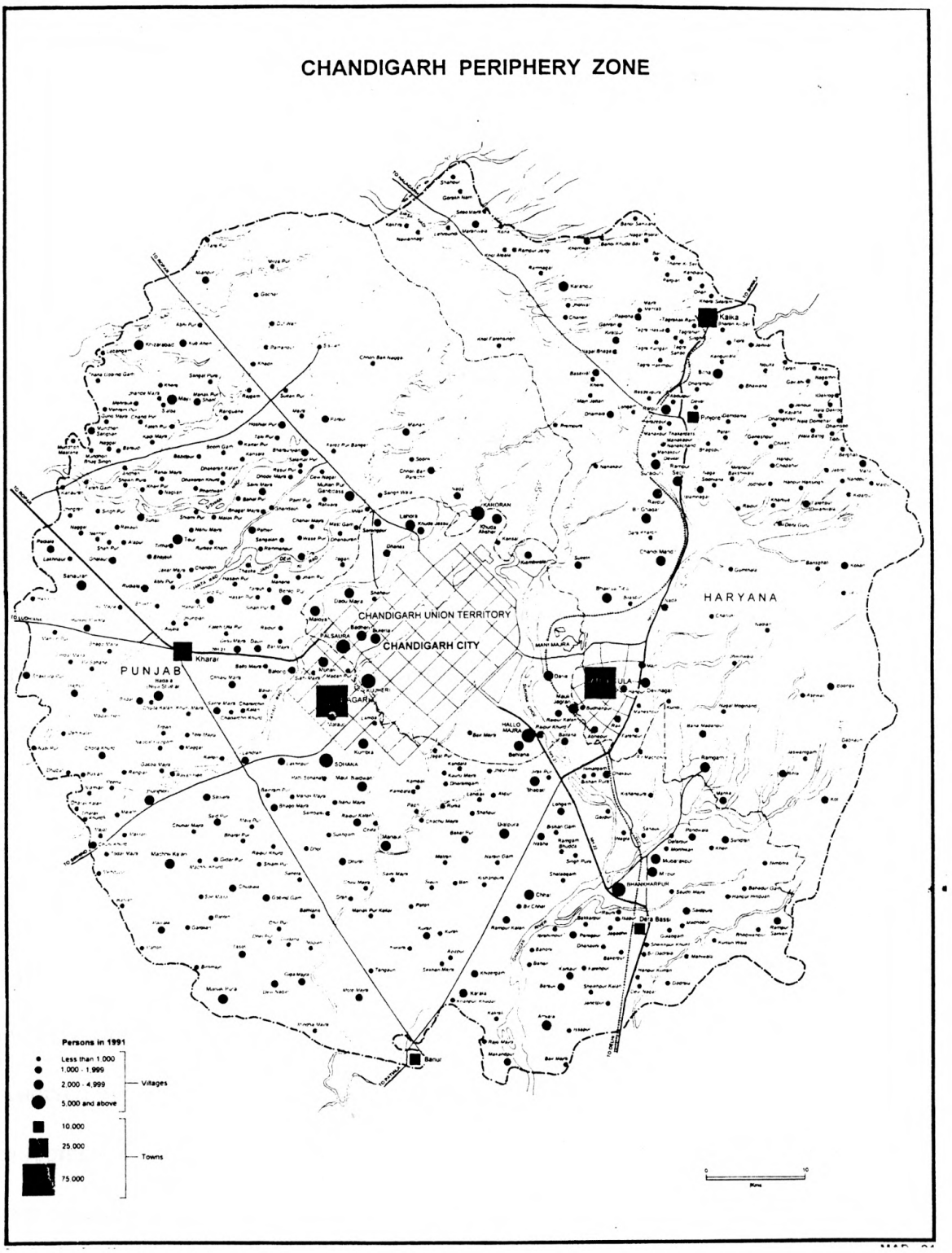

Fig. 7.53 The Chandigarh Periphery Zone.

These cities depend on Chandigarh for essential services such as medical care, education, work opportunities and recreation. The inflow of traffic in rush hours has increased dramatically, choking the main arteries of the city. This has resulted in the demolition of several roundabouts on the periphery of Chandigarh and their conversion into the conventional traffic-light intersection, to allow for a more regulated flow of traffic. Thus, the increase in population is causing changes in the original design of the city, especially on the periphery.

The satellite towns have been useful in easing the population pressure on Chandigarh. Many people prefer to live in these satellite towns where land is cheaper and the environment less polluted and less noisy. The rapid growth of the urban population in the peripheral areas of Chandigarh has led to increased concern in planning circles. To regulate growth and coordinate the efforts of the three different administrations (Punjab, Haryana and Chandigarh), it was decided that the entire region (with the satellite towns) needed to coordinate development as a part of a regional planning strategy. Several steps have been taken in this direction, but no definite strategy or plan has been approved as yet.

The city administration realizes that for the planning of Chandigarh to deal with the growth it is experiencing will not be an easy task. It will require a serious overhaul of policies, controls and strategies. There are three alternate policies that are being considered by the Chandigarh Administration.[213] First is to continue the prevention of all development contrary to the original plan, an approach that has not resulted in many positive results so far. The second alternate is to deflect the growth of the city to alternate urban centers in proximity to the city. The third alternate is to gear the city to respond to

increasing growth, which would essentially mean extensive restructuring of the city. Such an approach has the risk of destroying the original fabric of the city and altering its aesthetic character and thus needs careful thought. The most important agenda at this stage is to coordinate the development between Chandigarh and the neighboring cities of Mohali and Panchkula, to ensure orderly growth and to work towards a regional plan.

Chandigarh has some clear relationships to traditional Indian cities and some significant differences as well. It is possible that by restructuring the city according to more traditional strategies, some of the contemporary problems can be addressed. The aim should not be a blind imitation of the elements of the traditional city, but to apply the underlying principles that structure the city and determines the living pattern of the inhabitants.

Chandigarh, called the 'City Beautiful' by its inhabitants, has served as an inspiration for many new towns in India. While Chandigarh does afford an interesting juxtaposition with traditional Indian urban patterns, it is unfortunate that many new townships are being designed as facsimiles of Chandigarh without much effort to learn from and improve the shortcomings of the city. Instead, the mistakes are often blindly repeated. In general, The purpose of this research has also been to bring forth both the positive as well as negative aspects of the design of Chandigarh to enable future town planning ventures to delve into both the aspects of the city.

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[213] These recommendations are listed from the report by the Chandigarh Administration.

APPENDIX A

INTERVIEWS WITH ARCHITECTS AND TOWN PLANNERS IN CHANDIGARH

Interview with R. Sabharwal, Town Planner, Chandigarh Administration

The meeting with Town Planner, Sabharwal, started with a short description of the city and its development, by him. Excerpts from the description:

- Chandigarh was initially planned for only 30 sectors. This is now called the first phase of Chandigarh. It was a predominantly low-density area. The master plan indicated a second phase that was of higher density. The third phase was not envisaged then. In 1967, the Chandigarh Union Territory area was designated. Boundaries between Punjab and Chandigarh were defined and additional land was acquired by the Chandigarh Administration. There was no mention of the third phase in the original master plan but the increase in population necessitated that. The third phase is to consist entirely of high density housing to be developed by co-operative housing societies and by the Chandigarh Housing Board (CHB).
- The rate of growth of the city has been faster than anticipated.
- The transport has developed very fast and the traffic has increased beyond the capacity. Initially cars were limited and the traffic constituted mainly of scooters and bicycles. But one has to admire the fore-sightedness of Le Corbusier who had anticipated increase in fast moving traffic and devised the system of the 7 V's. So to a great extent the transport boom was anticipated.
- With the Western Command (army headquarters) shifted from Shimla to Chandigarh, The city could not extend to the north.

- Le Corbusier did not want a big industrial area. He had envisaged service industry and industry for daily use commodities, but not heavy-duty industry. Heavy industry has been added now, even though the area for the industrial zone is the same. SO even the second phase of Industrial area is full.
- Scope for future expansion of the city has decreased. One way out is to set limit to expansion. The expansion of the city was faster than anticipated. It is having an affect on the basic facilities in the city such as water and electricity availability, and is also affecting the quality of air, traffic and pollution level in the city. There is a scarcity of housing in the city because of which even the rents have gone higher affecting the economics of the city.

Author: What are some of the major changes that have taken place in the city.

Sabharwal: There have been some changes in the bye-laws of the city. The covered area has been increased from 55 per cent to 60 per cent. A room in the rear courtyard is allowed now. The number of permissible floors has increased. In old sectors such as Sectors 15, 18, 19, 20, 21, 22 and 27, shop-cum-flats (SCF) were provided, considering the traditional concept of using residential area for commercial use too. But now the flats, the residential units in these shop-cum-flats are also allowed to be used as commercial space for storage and for staff. The second phase now consists of mostly shop-cum-offices (SCO). In the third phase there are only flats (apartments), there is no plotted accommodation. There has been no substantial change in land use in Chandigarh. The changes in the city are inevitable because the society has changed, family life has changed and so has the living style changed.

Author: How would you rate the design of the city?

Sabharwal: The city has been successful. The system is being followed in other places throughout India.

Interview with Architect S.D. Sharma, former Chief Architect of Chandigarh

Author: How would you compare Chandigarh to traditional Indian cities?

S.D. Sharma: The first thing is to see what can be borrowed from traditional cities. Most important is the concept of courtyards in traditional housing. The courtyards form private extensions of living areas. Second is the use of passive solar elements such as chajjahs and jaalis. In the havelis of Rajasthan, the exterior keeps producing shadows.

It is also important to note the behavioral patterns in living, mainly the structure of society and living in a composite social unit. But it is important to note that there have been changes in the social setup with increasing population caused by migration from rural to urban areas. There is more stress on the urban population, which has also led to the breakdown of the joint family.

In Chandigarh, a minimum housing unit was decided upon by looking at the traditional living and housing. In rural or countryside living, even the poorest have a courtyard and nobody is homeless. In urban areas courtyards are considered as a luxury. Urbanity has increased poverty. Also it is better to have smaller towns like Chandigarh, with a population of around 500,000.

Author: What according to you are the important features of the Chandigarh plan?

S.D. Sharma: Important was the definition of the minimum and maximum house in the city. The government decided plot sizes for people on the basis of economic standard. The attention to orientation of the housing is important too. The frame controls and the architectural controls for V4 development, present an organized street picture. The strategy of development is important. Initially there were not too many takers so it was difficult to determine appropriate densities. It was decided to have low density in the elite upper sectors. The attention to economics and available technology is commendable. The planning of the city was basically divided into five parts: determining size of plots, built areas, cross sections, sections of roads, alleys for ventilation and vehicular movement.

Author: What according to you are the significant changes the city has undergone?
S.D. Sharma: The 10 mile periphery around Chandigarh, that was supposed to be a buffer zone, is being breached due to increase in population. Some of the intrusions are the army cantonment, the HMT township and also the satellite cities of Mohali and Panchkula.

Interview with Architect M.N. Sharma, former Chief Architect of Chandigarh and a member of the Indian design team assisting Le Corbusier

The interview started with M.N. Sharma sharing his experiences while working on the design of Chandigarh. He started the conversation with a description of the city and its housing. Excerpts from that are given below:

- The first concept for housing was to decide a program for a minimum house. It was decided that it would have a bedroom, a bath, a separate toilet with water closet, a kitchen and a verandah.
- Thirteen categories of housing were developed with the first category being the Chief Minister of the state and the thirteenth being housing for the peons.
- The housing by Nowicki has more Indian flavor, with courtyards influenced by houses in Indian cities, especially Rajasthan.
- Construction of permanent housing started with sectors 2, 5, 16, 22 and 23.
- Plots of various sizes were interspersed so that people would be encouraged to spread.
- Initially people were skeptical about the city, but with the merger of the princely states of Punjab in 1962, there was no looking back. By 1967 all the plots were sold. By 1966-67, the city began experiencing a shortage of land, making land expensive.
- Earlier, plots ranged from 5 *marlas* to 8 *kanals*, which was still comparatively smaller that what people were used to in Lahore and Punjab. But by 1987, it was decided that there will be no plot larger than 1 *kanal* (500 sq. yds.). The categories of government housing were also reduced from thirteen to five.
- As cost of construction went up, the standard of government housing reduced to meet the cost. Size was also reduced to meet cost. And now all housing is in the form of flats instead of houses.

Author: What according to you are the highlights of the design of Chandigarh?

M.N. Sharma: The biggest challenge facing the city was shortage of time and money and the material and technology constraints. What makes the housing in Chandigarh

different from the rest of the country is the attention paid to orientation, verdure, wind direction and rain. The architecture of the houses was based on providing shelter from natural elements. For breeze, the houses have jaalis. But people did not like them because of increasing cases of thefts, and also because they brought in dust. So people have blocked up the jaalis in a lot of places. This reflects a lack of enforcement on the part of the administration. Also the Institute de la Vie, Paris, conferred an award to the housing for poor in Chandigarh.

The carefully worked out landscaping of the city is also important.

When Chandigarh was built, there were not many qualified architects in the region and to control the architecture of the city, they established the frame controls. An 18" X 9" plastered frame is made mandatory in all small size housing.

Author: How would you compare Chandigarh to traditional Indian cities?

M.N. Sharma: Courtyards of traditional cities were reinterpreted. There was an equal and even greater concern to respond to climate of the region. The architects of Chandigarh were looking for purity, truth and needs, as does all traditional housing. There were some improvements made to. One of them was replacing floor chullahs with cooking on the counter, an idea that worked.

Author: What changes have taken place in the city and what is the most challenging factor in the development of Chandigarh today?

M.N. Sharma: Increased pressure on land has led to vertical development, resulting in four-storyed housing. The minimum sectional floor height of habitable rooms has been

reduced to 9'-9" and for bathrooms, to 7'-6". As far as the zoning is concerned, originally each plot was to house only one family. But people started sub-letting. Even barsatis were sub-let.

The most challenging aspect is to resettle the poor, which constitutes around 30-35 per cent of the population. The slum dwellers were originally workers and labor working on the construction of the city. They started making jhuggis within and outside the master plan. It was though that as construction would finish, they would move, but they did not. Another challenge is to revise the architectural controls to meet the needs of the people. Stricter enforcement of regulations and bye-laws is required. The city needs to meet the changing socio-economic conditions.

We did not anticipate such a growth of population that has led to shortage of electricity and water. There is strain on the infrastructure due to haphazard development of peripheral areas. It would have been better to go for a higher density in the beginning. The maintenance of open areas is challenging.

Author: What are your recommendations for the future of Chandigarh?

M.N. Sharma: It would be better to give land for group housing to different architects than giving it to just one housing society.

We need to create public awareness about the heritage of the city. People need to be made more respectful and responsible towards the city.

BIBLIOGRAPHY

Selected Sources on Chandigarh

Bhatnagar, V.S. (1996). *Chandigarh, the city beautiful, environmental portfolio of a modern Indian city.* New Delhi: A.P.H. Pub. Corp.

Caputo, Silvio. (1990). *Corb's dream come true.* In *Building Design*, April 1990, No.982, p.40-41.

Chandigarh Administration. (1998). *Development of Chandigarh in regional context.* Chandigarh: Chandigarh Administration. (unpublished report).

Chandigarh Perspectives. (1999). *Celebrating Chandigarh.* [World Wide Web Page]. Available: http://www.cperspectives.org. Jan.20, 1999

Chandoke, S.K. (1990). *Nature and structure of rural habitations.* New Delhi: Concept Publishing Company.

Chawla, Bhagatjit S. (1997). *The Capital of Punjab (Development & Regulation) Act, 1952.* Chandigarh: Chawla Publications.

Chowdhury, U. E . (1964). *Recent works of Pierre Jeanneret.* In *Progressive Architecture.* Feb. 1964. Vol. XLV , No.2. pp. 148-155.

CITCO. (1998). *Chandigarh: Atlas and Guide.* Chandigarh:CITCO.

Constant, Caroline. (1987). *From the Virgilian dream to Chandigarh.* In *Architectural Review,* Jan. 1987, Vol. 181, pp.66-72.

Copper, Wayne. (1983). *The Figure/Grounds.* In *The Cornell Journal of Architecture*, Fall 1983, Vol.2, pp.42-53.

Correa, Charles. (1989). *The new landscape. Urbanisation in theThird World.* Singapore: Butterworth Architecture.

Devillers, Christian. (1987). *Chandigarh, Force de la Pensée Moderne.* In *Architecture d'aujourd'hui*, Sept. 1987, No.252, p.37.

Director of Census Operations. (1987). *Census of India 1981, Chandigarh Part VIII- A & B. Household Tables.* Chandigarh: Chandigarh Administration.

Director of Census Operations. (1994). *Census of India 1991, District Chandigarh.* Chandigarh: Chandigarh Administration.

Drew, Jane. (1953). *Chandigarh Capital City Project.* In *Architect's Year Book 5*, pp.56-66. London: Elek Books Ltd.

D'Souza, Victor. (1968). *Social structure of a planned city,Chandigarh.* Bombay:Orient Longmans.

D'Souza, Victor. (1973). *The problem of housing in Chandigarh.* In *Urban and rural planning thought.* Oct. 1973, Vol.16, No.4, pp. 254-266.

Emmentt, Robert C. (1977). *Guide to the Albert Mayer Papers on India in the University of Chicago Library.* The University of Chicago: Committee on Southern Asian Studies & South Asia Reference Center.

Evenson Norma. (1966). *Chandigarh.* Berkeley: University of California Press.

Fry, Maxwell. (1955). *Chandigarh-The Capital of the Punjab.* In RIBA Journal, Jan. 1955, Vol. 63, pp.87-95.

Futagawa, Yukio (Ed.). (1974). *Le Corbusier, Chandigarh: The New Capital of Punjab, India, 1951-.* Global Architecture, No.30. Tokyo: ADA, Edita.

Gandhi, Smiti. (1990). *Development controls and regulations in Chandigarh. Evaluation and recommendations.* Master of community Planning Thesis. University of Cincinnati: Division of Graduate Studies and Research.

Giovannini, Joseph. (1997). *Chandigarh Revisited* .In *Architecture*, July 1997, Vol.86, No.7 ,pp.41-45.

Gupta, Sehdev K. (1975). *A Study of the sociological issues in Chandigarh.* In *Ekistics,* June 1975, Vol.39, No.235, pp.411-16.

Gupta, Sehdev K. (1974). *A Study of sociological issues and urban development in India.* In *Architectural Design*, June 1974, pp.362-368.

Jangra, V.K. & R.K. Dhariwal. (1996). *Chandigarh Urban Development Laws.* Chandigarh: The Himalia Press.

Joshi, Kiran. (1999). *Documenting Chandigarh.* Ahmedabad: Mapin Publishing Pvt., Ltd.

Kalia, Ravi. (1987). *Chandigarh: in search for an identity.* Carbondale, IL: Southern Illinois University Press.

Krishan, Arvind. (1976). *Housing design criteria for social, cultural and climatic conditions of Chandigarh, India.* M.Arch. Thesis. Seattle: University of Washington.

Krishan, Gopal. (1997). *Chandigarh 2020, projections of population and class structure.* New Delhi: Swan Publishers.

Krishan, Gopal. (1999). *Inner spaces- outer spaces of a planned city, A thematic Atlas of Chandigarh.* Chandigarh: Chandigarh Perspectives.

Le Corbusier. (1974). *Chandigarh, the new capital of Punjab.* Tokyo: A.D.A. Edita.

Le Corbusier. (1983). *Chandigarh: city and musee.* New York: Garland Pub.

Le Corbusier. (1983). *Chandigarh—Capitole.* New York: Garland Pub.

Le Corbusier. *Statute of the Land.* In *Chandigarh: Planning and Architecture.* [World Wide Web Page]. Available:http://www.nic.in/chandigarh/mplan3.htm. April 6, 1998.

Maass, Robert. (1987). *Chandigarh Revisited.* In *Architectural Record,* July 1987, Vol.175, No.7, pp.72-75.

Mayer, Albert. (1950). *The New Capital of the Punjab.* In *Journal of the American Institute of Architects,* Vol.14, No.4, pp.166-175.

Mayer, Albert. (1958). *Pilot Project, India.* Berkeley: University of California Press.

Mayer, Albert. (1964). *Architecture as Total Community: The Challenge Ahead.* In *Architectural Record,* April 1964, pp.169-178.

Mayer, Albert. (1967). *The Urgent Future. People, Housing, City, Region.* New York: McGraw Hill Inc.

Sorkin, Michael. (1998). *Chandigarh After Le Corbusier.* In *Architectural Record.* Feb.1998, pp. 68-73.

Mumford, Lewis. (1954). *Nowicki's Work in India.* In *Architectural Record,* Sept. 1954, Vol.116, No.3, pp.153-159.

National Informatics Center. (1999). *City Profile.* [World Wide Web Page]. Available: http://chandigarh.nic.in/chandigarh/default.htm. June 29, 1999.

Prakash, Aditya. (1983). *Reflections on Chandigarh.* New Delhi, India: Navayug Traders.

Saksena, R. N. (1961). *Refugees. A study in changing attitudes.* Bombay, India: Asia Publishing House.

Sarin, Madhu. (1982). *Urban planning in the third world: the Chandigarh experience.* London: Mansell Pub.

Sealey, Neil E. (1982). *Planned cities in India.* University of London: Extramural Division, School of Oriental and African Studies.

Shah, A.B. & Rao, C.R.M. (1965). *Tradition and Modernity in India.* Bombay, India: P.C. Manaktala and Sons Private Ltd.

Sharma, Kavita, Sethi, Chitleen K., Meeta & Rajivlochan. (1999). *Chandigarh Lifescape:Brief Social History of a Planned City.* Chandigarh: Chandigarh Administration.

Sharma, Rakesh & Prakash, Aditya. (1975). *Improving Chandigarh's peripheral villages. January 24,1999*

Singh, Patwan. (1999). *A Le Corbusier Vision Blurred Over Time.* The New York Times. January 24, 1999.

Vale, Lawrence J. (1992). *Architecture, power and national identity.* New Haven: Yale University Press.

Wakley, Patrick Ion & Schmetzer, Hartmut. (1974). *Chandigarh.* In *Architectural Design,* June 1974, Vol. 44, pp. 349-361

Watkin, David. (1992). *Capitali D'Occidente.* In *Arbitare*, June 1992, No. 308, pp.144 –156.

Selected Sources on Le Corbusier

Blake, Peter. (1993). *No Place Like Utpoia.* New York: Alfred A. Knopf, Inc.

Boudon, Philippe. (1972). *Lived-in-architecture: Le Corbusier's Pessac revisited.* Cambridge, MA: The MIT Press.

Brady, Darlene A. (1985). *Le Corbusier: An annotated bibliography.* New York: Garland Publishing, Inc.

Brooks, H. Allen (Ed.). (1987). *Le Corbusier:The Garland Essays.* New York: Garland Publishing, Inc.

Curtis, William J. (1986). *Le Corbusier: Ideas and Forms.* Oxford: Phaidon Press.

Fishman, Robert. (1982). *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright, Le Corbusier.* Cambridge: The MIT Press.

Frampton, Kenneth. (1992). *Modern Architecture: A critical history.* London: Thames and Hudson Limited.

Guiton, Jacques. (1980). *The ideas of Le Corbusier on architecture and urban planning.* New York: G. Braziller.

Guiton, Jacques. (1981). *The ideas of Le Corbusier on architecture and urban planning.* New York: George Braziller.

Jordan, Robert F. (1972). *Le Corbusier.* New York: Lawrence Hill & Co.

Le Corbusier. (1948). *Concerning Town Planning.* New Haven: Yale University Press

Le Corbusier. (1960). *Creation is a patient serach.* New York: Praeger.

Le Corbusier. (1967). *Le Corbusier, 1910-65.* New York: Praeger.

Le Corbusier. (1967). *The Radiant City: Elements of a Doctrine of Urbanism to be used as the basis of our Machine Age Civilization.* London: Faber.

Le Corbusier. (1970). *Towards a new architecture.* New York: Prager.

Le Corbusier. (1973). *The Athens Charter.* New York: Grossman Publishers.

Le Corbusier. (1979). *The city of tomorrow and its planning.* New York: Payson & Clarke.

Le Corbusier. (1981). *Le Corbusier Sketchbooks Vol. 1-4.* Cambridge: The MIT Press.

Le Corbusier. (1987). *Voyage d'Orient Sketchbooks Vol. 1-6.* New York: Rizzoli International Publications, Inc.

Le Corbusier. (1995). *Les Voyage d'Allemagne Carnets.* New York: The Monacelli Press, Inc.

Le Corbusier. (1997). *The Final Testament of Pere Corbu.* New Haven: Yale University Press.

Mackenzie, Christopher. (1993). *Le Corbusier in the sun.* In *Architectural Review,* Feb.1993, Vol. CXCII, No. 1152. Pp.71 –74.

McLeod, Mary Caroline. (1985). *Urbanism and Utopia: Le Corbusier from regional Syndicalism to Vichy.* Princeton University: School of Architecture (Ph.D. Dissertation)

Moos, Stanislaus von. (1979*). Le Corbusier: elements of a synthesis.* Cambridge: The MIT Press.

Passanti, Francesco. *The Skyscapers of the Ville Contemporaine.* In *Assemblage*, Oct. 1987, No.4, pp. 53-65.

Smithson, Alison. (1982). *The Emergence of Team 10 out of CIAM.* London: The Architectural Association.

Walden, Russell. (1977). *The Open Hand.* Cambridge: The MIT Press.

Selected Sources on Traditional Indian Architecture

Amirahmadi, Hooshang & Salah S. El-Shakhs (Eds.). (1993). *Urban development in the Muslim world.* New Brunswick: Center for Urban Policy Research.

Anderton, Frances. (1989). *Learning from Jaipur.* In *The Journal of Architectural Education.* Vol.42, No.4, Summer 1989. Pp. 15-24.

Bansal, Ajay. (1995). *Urban regeneration: A strategy for regulating the physical transformation of the built form in the historic inner cities in developing countries.* M.Arch. Thesis, Kansas State University.

Batley, Claude. (1965). *The Design development of Indian Architecture.* London: Alec Tiranti Ltd.

Bhatt, Vikram & Peter Scriver. (1990). *After the Masters.* Ahmedabad: Mapin Publishing Pvt.

Bhushan, Bharat. (1985). *Design elements and urban form. Case Study: Jaipur, India.* Master of Regional and Community Planning Thesis, Kansas State University.

Borden, Carla M. (Ed.). (1989). *Contemporary Indian traditions. Voices on culture, nature and the challenge of change.* London: Smithsonian Institution Press.

Bourdier, Jean-Paul & AlSayyad, Nezar. (1989). *Dwellings, Settlements and Traditions. Cross Cultural Perspectives.* Lanham, MD: University Press of America.

Chandoke, S.K. (1990). *Nature and structure of rural habitations.* New Delhi: Concept Publishing Company.

Cohn, Bernard S. (1971). *India: The social anthropology of a civilization.* New Jersey: Prentice-hall, Inc.

Cooper, Ilay & Barry Dawson. (1998). *Traditional buildings of India.* London: Thames and Hudson Ltd.

Dagnes, Bruno & Vatsayayan, Kapila (Eds.). (1984). *Mayamatam: Treatise of Housing, Architecture and Iconography.* New Delhi: Indira Gandhi National Center for the Arts.

Davies, Philip. (1985). *Splendours of the Raj.* London: John Murray Publishers, Ltd.

Delhi Government. (1999). *Delhi, National Capital Territory of India: History* [World Wide Web Page]. Available: http://delhigovt.nic.in/delhigovt/history.html .

Desai, Madhavi. (1989). *Research Method for Study of Traditional Dwellings. Case Study: Bohra Habitats, India.* In *Traditional Dwellings and Settlements,* Working Paper Series, Vol.2, IASTE, WP02-89. Berkeley: University of California Press.

Doshi, Saryu (Ed.). (1982). *The Impulse to Adorn: Studies in Traditional Indian Architecture.* Bombay, India: Marg Publications.

Eglar, Zekiye. (1960). *A Punjabi Village In Pakistan.* New York: Columbia University Press.

Emmentt, Robert C. (1977). *Guide to the Albert Mayer Papers on India in the University of Chicago Library.* The University of Chicago: Committee on Southern Asian Studies & South Asia Reference Center.

Evenson, Norma. (1989). *The Indian Metropolis: A view toward the West.* New Haven: Yale University Press.

Fanshawe, H.C. (1902). *Delhi: Past and present.* London: John Murray.

Fonseca, Rory. (1969). *The Walled City of Delhi.* In: *Shelter and Society.* Oliver, Paul. (Ed.). Pp. 103-115. London: The Cresset Press.

Fonseca, Rory. (1971). *The Walled City of Old Delhi.* In *Ekistics*, Jan. 1971, No. 182, pp.72-80.

Fox, Richard G. (Ed.). (1970). *Urban India: Society, space and image*. In *Monograph and Occasional Paper Series*, Monograph No. 10. Duke University: Program in Comparative Studies on Southern Asia.

Goodfreind, Douglas E. (1982). *Shahjahanabad- Old Delhi: tradition and planned change.* In *Ekistics*, Vol.49, No.297, Nov.-Dec. 1982, pp.472-75.

Gupta, Narayani. (1981). *Delhi Between Two Empires, 1803-1931.* New Delhi: Oxford University Press.

Hambly, G. (1968). *Cities of Mughal India: Delhi, Agra and Fatehpur Sikri.* London: Elek.

Havell, E.B. (1927). *Indian Architecture.* London: John Murray.

Herdeg, Klaus. (1977). *Formal Structure in Indian Architecture.* New York: Jaap Rietman, Inc.

Indian Meteorological Department, Government of India. (1991). *Climate of Haryana and the Union Territories of Delhi and Chandigarh.* New Delhi: Controller of Publications.

Jadhav, Rajratna U. (1998). *Eastern Regionalism and Indian Identity: A Case Study of Charles Correa's Inter-University Center for Astronomy and Astrophysics & Raj Rewal's Central of Educational Technology.* M.Arch. Thesis, Kansas State University.

Jain, A.K. (1990). *The Making of a Metropolis.* New Delhi: National Book Organisation.

Jain, Kulbhushan. (1978). *Morphostructure of a planned city Jaipur, India.* In *Architecture+Urbanism*, Aug.1978, No.95, pp.107-120.

Kagal, Ayesha (Ed.) (1989). *Haveli.* Ahmedabad,: Mapin Publishing Pvt., Ltd.

Kagal, Carmen (Ed.). (1986). *Vistara. The Architecture of India.* Bombay: Tata Press Limited.

Karve, Irawati. (1953). *Kinship Organization in India.* In *Deccan College Monograph Series 11.* Pune, India: Post-Graduate and Research Institute

Lang, Jon, Madhavi Desai & Miki Desai. (1997). *Architecture and Independence. The Search for Identity—India 1880 to 1990.* New Delhi: Oxford University Press.

Lewis, Oscar. (1958). *Village Life in Northern India.* Urbana, IL: University of Illinois Press.

Mitra, Ashok. (1962). *The Forces Behind the Modern Movement.* In *Lalit Kala Contemporary*, June 1962, No.1.

Murison, Hamish, & Lea, John P. (Eds.). (1979). *Housing in Third World Countries. Perspective on Policy and Planning.* New York: St. Martin's Press.

Noe, Samuel V. (1982). *Old Lahore and Old Delhi: Variations on a Mughal theme.* In *Ekistics*, July-Aug.1982, Vol.49, No.295.

Oakley, David & Unni, K. Raman. (1965). *The rural habitat. Dimension of change in village homes and house groupings.* New Delhi, India: School of Planning and Architecture.

Office of the Registrar General. (1952). *Census of India, 1951.* New Delhi: Manager of Publications.

Office of the Registrar General. (1962). *Census of India, 1961.* New Delhi: Manager of Publications.

Office of the Registrar General. (1972). *Census of India, 1971. Series 17: Punjab*. New Delhi: Manager of Publications.

Office of the Registrar General. (1972). *Census of India, 1971. Series 25: Chandigarh*. New Delhi: Manager of Publications.

Office of the Registrar General. (1982). *Census of India, 1981. Series 17: Punjab*. New Delhi: Manager of Publications.

Pereira, Jose. (1987). *Elements of Indian Architecture*. New Delhi: Motilal Banarsidass.

Prabha, K. (1979). *Towns: A Structural Analysis. A Case Study of Punjab*. New Delhi: Inter India Publications.

Pramar, V.S. (1989). *Haveli*. Ahmedabad: Mapin Publishing Pvt. Ltd.

Rapoport, Amos. (1969). *House form and culture*. Engelwood Cliffs, New Jersey: Prentice-Hall, Inc.

Rapoport, Amos (Ed.). (1976). *The mutual interaction of people and their built environment: A cross-cultural perspective*. Paris: Mouton Publishers.

Roy, Ashim. (1978). *History of Jaipur City*. New Delhi: Manohar Publications.

Sabikhi, Ranjit. (1985). *Outdoor space in the Indian context*. In *Techniques et Architecture*, No.361, Aug.-Sept. 1985, pp.134-141.

Saksena, R. N. (1961). *Refugees. A study in changing attitudes*. Bombay, India: Asia Publishing House.

Sealey, Neil E. (1982). *Planned cities in India*. University of London: Extramural Division, School of Oriental and African Studies.

Shah, A.B. & Rao, C.R.M. (1965). *Tradition and modernity in India*. Bombay, India: P.C. Manaktala and Sons Private Ltd.

Shah, Ajay. (1994). *An analysis of traditional and modern neighborhood units in India-A case study*. M.Arch. Thesis, Kansas State University

Singh, Khushwant & Raghu Rai. (1983). *Delhi: A Portrait*. New Delhi: Oxford University Press.

Srinivas, M.N. (1966). *Social change in modern India*. Los Angeles: University of California Press.

Tillotson, G.H.R. (1989). *The Tradition of Indian Architecture*. New Haven: Yale University Press.

Vale, Lawrence J. (1992). *Architecture, power and national identity*. New Haven: Yale University Press.

Watts, Donald J. (1981). *Recurrent patterns in traditional Afghan settlements*. Afghanistan Journal, Vol.8, No.2 (First Quarter, 1981).

Wolpert, Stanley. (1965). *India*. Englewood Cliffs: Prentice-Hall Inc.

Zach, Paul. (1989). *Delhi, Agra, Fatehpur Sikri*. New Delhi: Time books International.

General refernces

Benevolo, Leonardo. (1980). *The history of the city*. London: Scholar Press.

Benevolo, Leonardo. (1971). *History of modern architecture, Vol. 1. The tradition of modern architecture*. Cambridge: The MIT Press

Benevolo, Leonardo. (1971). *History of modern architecture, Vol.2. The modern movement*. Cambridge: The MIT Press

Bhatia, Gautam. (1994). *Punjabi Baroque and other memories of architecture*. New Delhi: Penguin Books.

Blake, Peter. (1993). *No place like Utopia*. New York: Alfred A. Knopf, Inc.

Bognor, Botond. (1990). *On the critical aspects of regionalism*. In *Architecture+Urbanism*, March 1990, No.234, pp.11-18.

Calinescu, Matei. (1987). *Five Faces of Modernity*. Durham: Duke University Press.

Choay, Francoise. (1969). *The Modern City: Planning in the 19th Century*. New York: George Braziller.

Cohen, Stuart. (1974). *Physical Context/Cultural Context: Including it All*. In *Oppositions 2*, Jan. 1974, pp. -401.

Colquhoun, Alan. (1981). *Essays in Architectural Criticism*. Cambridge: The MIT Press.

Conrads, Ulrich (Ed.). (1994). *Programs and Manifestoes on 20 th-century Architecture*. Cambridg: MIT Press.

Correa, Charles. (1996). *Charles Correa*. London: Thames & Hudson, Ltd.

Curtis, William J. (1988). *Balkrishan Doshi: An architecture for India.* New York: Rizzoli International, Inc.

Curtis, William. (1987). *Modernism and the search for Indian identity.* In *Architectural Review*, Aug. 1987, Vol.181, No.1086, pp.32-38.

Drew, Jane & Maxwell Fry. (1964). *Tropical architecture in the dry and humid zones.* New York: Reinhold Publishing Corporation.

Faramway, Ali. (1989). *Our professions fascinations with traditional dwellings and settlements.* In *Traditional Dwellings and Settlements,* Working Paper Series, Vol.16, IASTE, WP16-89. Berkeley: University of California Press.

Frampton, Kenneth. (1983). *Prospects for a Critical Regionalism.* In *Perspecta 20, The Yale Architectural Journal.* Cambridge: The MIT Press.

Fry, Maxwell. (1944). *Fine Building.* London: Faber & Faber Ltd.

Gallion, Arthur B. & Simon Eisner. (1980). *The Urban Pattern.* New York: D. Van Nostrand Company.

Gosling, David & Barry Maitland. (1984). *Concepts of Urban Design.* New York: St.Martin's Press.

Heyer, Paul. (1995). *Urban Essays.* New York: Civilities International.

Krier, Rob. (1979). *Urban Space.* New York: Rizzoli Publications, Inc.

Krier, Leon. (1992). *Architecture & Urban Design 1967-1992.* New York: St. Martin's Press.

Lewis, Mumford. (1938). *The Culture of Cities.* New York: Hartcourt, Brace and Company, Inc.

Modak, N.V. & V.N. Ambedkar. (1971). *Town and country planning and housing.* New Delhi: Orient Longman, Ltd.

Murison, Hamish S. & John P. Lea (Eds.). (1979). *Housing in Third World countries. perspectives on policy and practice.* New York: St.Martin's Press.

Ockman, Joan. (1993). *Architecture Culture 1943-1968. A Documentary Anthology.* New York: Rizzoli International Publications, Inc.

Payne, Geoffrey K. (1977). *Urban housing in the Third World.* London: Leonard Hill.

Randhawa, M.S. (1954). *Out of the Ashes.* Punjab: Public Relations Department.

Rapoport, Amos. (1977). *Human aspects of urban form.* Oxford: Pergamon Press.

Smithson, Alison & Peter. (1967). *Urban Structuring. Studies of Alison & Peter Smithson.* New York: Reinhold Publishing Corporation.

Smithson, Alison. (1982). *The Emergence of Team 10 out of CIAM.* London: The Architectural Association.

Tafuri, Manfredo. (1976). *Architecture and Utopia Design and Capitalist Development.* Cambridge: The MIT Press.

Tafuri, Manfredo. (1986). *Modern Architecture 2.* New York: Rizzoli International Publications

Taylor, Brian Brace. (1992). *Raj Rewal.* London: Mimar Publications Concept Media Ltd.

Theodorson, George A. (Ed.). (1961). *Studies in human ecology.* New York: Harper & Row.

Tzions, Alexander & Liane Lefaivre. (1990). *Why Critical Regionalism Today?* In *Architecture+Urbanism*, May, 1990, No.236, pp.23-33.